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TREATMENT
OF
HYPERPYREXIA
—
DR WILSON FOX

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1871

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T. H. McBride

ON
THE TREATMENT
OF
HYPERPYREXIA

AS ILLUSTRATED IN ACUTE ARTICULAR RHEUMATISM

LANE LIBRARY
BY MEANS OF

THE EXTERNAL APPLICATION OF COLD

BY

WILSON FOX, M.D. F.R.C.P.

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FELLOW OF UNIVERSITY COLLEGE, LONDON

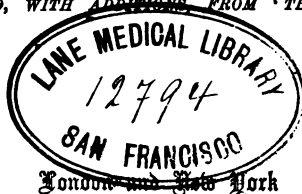
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PREFACE.

ALTHOUGH three of the cases narrated in this paper have already appeared in the *Lancet*, I am induced, by the importance of the subject to which they relate, to republish them in a separate form. By doing so I am able to present to the profession more complete details of their progress than I was able to do in a weekly journal; and for this reason I have appended the tables of the observations made on the temperature during the treatment by cold applications, and also during their later progress. These have been somewhat abbreviated by the omission of minor variations which occurred, but every important rise or fall has been noticed. Two charts have also been introduced, which Mr. Newington, one of the Physicians' Assistants of University College Hospital, has had the kindness to prepare for me, in order to give a connected view of the progress of the cases.

I have further appended a table showing the effect of the immersion of the patients in the baths employed, in order to exhibit the rate at which the temperature was lowered by each bath.

I have also republished the history of a case previously treated in the same manner, but where bleeding had been practised prior to the treatment by cold, when the temperature had already reached a fatal height. It has appeared to me that the comparison of the effects of treatment in this case with those observed in the others may not be uninteresting.

I have also collected in a table the chief details of twenty-two cases of this class recently published, and which are referred to in various parts of my Commentary; and I have in addition published *in extenso* the observations made in one which occurred in my practice last summer.

A series of sphygmographic tracings of the pulses of the two patients the subjects of this memoir has been added, as the intensity of the dichrotism in the second exceeds any that I have found depicted in the works of the writers on sphygmography. I trust that these additional facts may not be without their value to the profession as a guide to the successful treatment of this hitherto fatal class of cases.

67 GROSVENOR STREET:

September 1871.

ON

THE TREATMENT OF HYPERPYREXIA.

CASES of acute rheumatism in which, after a course of variable severity, the temperature suddenly rises from 103° or 104° to 107° , 108° , or 109° , have usually proved fatal within a very short time after the latter temperature (109°) has been attained. In the majority, indeed, of published instances death has ensued within one or two hours; and Wunderlich regards this terminal rise as 'proagonic,' or as one of the phenomena of death, a view still further borne out by the fact that a further elevation is often continued for one or two hours after life has apparently ceased.

I published in the *Lancet* last year¹ an instance of a case where, by means of repeated immersions in the cold bath, life was protracted for nearly thirty-six hours after the patient's temperature, while suffering from acute rheumatism, had reached 109° , death finally taking place by exhaustion at a temperature of 104.4° . This case had been complicated by a large bleeding, practised before the bath was employed, in the hope of thereby producing a reduction of temperature, when this had reached 107.8° , and when the patient was violently delirious. In my commentary on that case I showed that venesection to more than twenty ounces had no effect whatever in checking the rise of the temperature; and I also expressed a hope that cases of this nature, treated in future by the cold bath and without venesection, might yet show a favourable termination.

¹ See Case III. Appendix.

This hope, I am glad to say, has been realised in two cases which have been under my care in the course of the present summer ; where the patients, a man and a woman, have completely recovered under this treatment, after rapidly attaining a temperature, in the one case, of 110° , and, in the other, of 107.3° . Both were first attacks of the disease ; and, indeed, this ordinary fatal mode of termination appears to be more common under these circumstances.

I shall narrate them in the order in which they occurred, though they were both in the hospital at the same time ; and the rise of temperature in each occurred within two days of one another, the higher temperature attained by the woman being due to the fact that we were not so fully prepared for the emergency as in the subsequent case.

CASE I.—The female patient, Mrs. Brophy, aged forty-nine, married, no children, was admitted into University College Hospital on the 5th of June 1871. Had lived badly until twelve months ago. Since then she had been in better circumstances. No direct hereditary tendencies ; but one aunt had died from rheumatic fever. No previous diseases, except ‘inflammation of the liver’ fifteen years ago ; but she was liable to hysteria and palpitation. Menstruation had ceased for twelve months past.¹ Her present illness—her first attack of rheumatic fever—began on the night of the 27th of May, with pain in the right hand. She had had slight pains in the feet for some days previously, but had not laid up. On the 29th (two days later) she had a rigor, which recurred on several successive days. After this the knees and ankles were affected. She knows of no cause for the illness. Did not perspire before admission, had no cough, and had been free from pain in the chest or palpitation.

On admission, on the seventh day after the first rigors, or on the ninth day of the disease, the patient looked depressed ; she had an earthy tint of skin ; the tongue was furred and tremulous ; the joints of all her extremities were swollen and painful, but especially the knees, ankles, hands and feet. Grazing friction was heard over the heart : the apex was in the fourth interspace,

¹ This returned after her recovery while at the All Saints’ Convalescent Home at Eastbourne.

a quarter of an inch outside the nipple, but the area of dulness was not increased. The cardiac region was tender. The first sound was muffled at the apex; but there was no distinct murmur. The patient perspired freely. She was placed on the treatment by the perchloride of iron, introduced by my friend and colleague, Dr. Reynolds, half a drachm of the tincture being given every four hours, and the affected joints were wrapped in cotton-wool.

On the 9th of June (the thirteenth day of the disease), the patient's state was much the same. She perspired profusely; the tongue was still furred. Friction was abundant over the heart; the cardiac dulness extended only to the third cartilage. The joints of the upper extremities were more painful, those of the lower extremities less so.

On the morning of the 10th (fourteenth day of illness) there was little change, and the patient still presented the appearance of an ordinary case of acute rheumatism, with a rather marked degree of weakness. Up to this date the pyrexia, as measured by the temperature, had been of an extremely moderate type. On the 5th, the day of admission, it had reached, in the evening, 102.9° ; but though taken regularly on the mornings and evenings, it had only once subsequently (on the evening of June 9th) been even as high as 101.2° , and on two occasions the morning temperature was 99.2° and 99.6° . On the morning of the 10th it was measured, but by some accident not recorded, though found higher than before; I am, however, assured by my excellent clinical clerk, Mr. Benham, who took it, and by my most reliable assistant, Mr. Bindley, who was present at the time, that it did not exceed 102° (axilla). The patient's aspect was then that of increased prostration, and she was perspiring freely, but no other change was noticed in her general state. At 3 P.M. on the same day (fourteenth day, five days after admission, and twelve days since the rigor), the temperature was found to have risen to 105° , and at 5.30 P.M. it was 105.6° (axilla). I was sent for, and reached the hospital at 6 P.M. The temperature in the axilla was then 106.4° . It had risen 4.4° since 9 A.M., or within nine hours. At this time the patient was entirely free from pain in her joints. She was conscious, but spoke with difficulty, and with an extremely slow

articulation; otherwise her manner was natural. She complained only of weakness. The face was a dusky purple, the eyes suffused, and the conjunctivæ much injected. A thick mucus had collected in the inner canthi. The tongue was tremulous, as were also the hands. She lay with her eyes closed, sighed deeply from time to time, but roused when spoken to. The pulse was 112, the respirations 44 in the minute. The heart's apex was immediately under the nipple, in the fourth interspace. The dulness was at the level of the third left cartilage. There was strong friction at the base; a short, highly-pitched murmur at the left apex. Having in one case of rheumatic fever, when the temperature had risen rapidly from 101.8° to 104.4° , seen an immediate and rapid fall of 4.4 degrees (to 100°) within ten hours, and without any subsequent exacerbation, follow the administration of one scruple of quinine, I also gave this patient a scruple of quinine in powder, suspended in mucilage; and this dose was repeated every half-hour until 8.50 P.M., when the patient had taken in all 120 grains of quinine. The last dose was vomited. From 6 P.M. to 7.35 P.M. the temperature oscillated between 106.6° and 106.2° . The pulse varied from 108 to 112; the respirations from 38 to 44 in the minute. At 7.50 P.M. the temperature had risen to 106.9° ; pulse 120, respirations 40 in the minute.

Being at this time obliged to leave the hospital for a short time, I requested my assistant, Mr. Bindley, in case the temperature reached 107° , to put the patient into a bath at 96° , and to keep her there, proposing to endeavour to effect by this means a gradual reduction of temperature. There was, however, some delay in getting the bath prepared, and in the meantime the temperature rose rapidly, being 107.1° at 8.5 P.M., and 108.4° at 9.15 P.M., when she became entirely unconscious, and it had reached 109.1° at 9.50 P.M., when the patient was put into a bath at 96° . At this time I returned, and thought the patient in the act of dying. She was absolutely unconscious; the pulse was imperceptible; the face was highly cyanotic; and she was drawing the few last irregular, gasping, stertorous respirations which commonly precede the act of death. At 9.55 P.M. the temperature in the rectum was 110° . I had questioned whether to take her out of the bath

before death, but finding the temperature still rising, I determined to make one vigorous effort at its reduction. Ice was fetched; a large lump was placed on her chest, another on her abdomen; a bag filled with ice was tied down the length of her spine; and while two assistants baled the warmer water out of the bath, two others poured iced-water over the patient as rapidly as the pails could be filled. At 10.10 P.M., or within fifteen minutes, the temperature of the rectum had fallen to 109.1° ; in five minutes more (10.15 P.M.) to 108.4° (the average temperature of the bath being then 66°); at 10.20 P.M. the temperature in the rectum had fallen to 107.5° , and at 10.25 P.M. to 106.2° . The pulse now became perceptible (140), and the patient showed some signs of consciousness. Brandy was freely given. At 10.35 P.M., or within half an hour of the time that ice was first applied, the temperature in the rectum had fallen to 103.6° , and the patient was then taken out of the bath (temperature of bath 63°), and the ice-bag was removed from the spine. At 10.55 P.M. the temperature in the rectum was 100.6° . The patient could speak, and had a certain imperfect consciousness. The lividity of the face and the suffusion of the eyes had disappeared, but spasms of rigidity attacked at times the muscles of the lips and of the neck, but not of the limbs. At 11.5 P.M. the rectum temperature was 99.5° . As there was some difficulty in swallowing, an enema of brandy was now given. The patient took six ounces of brandy from 10.10 P.M. to 11.10 P.M. At 11.25 P.M. the temperature in the vagina (taken here as an enema was retained in the rectum, the patient being nearly unconscious) was 97.4° . The temperature had therefore fallen 6.2° within fifty minutes after her removal from the bath, when her temperature was 103.6° ; and the total reduction from the time of the first application of the ice was 12.4° Fahr. within a period of an hour and a half, during which she had really only been exposed to the influence of the cold for half an hour. At 11.40 P.M., or twenty minutes later, the temperature still remaining at 97.4° (vagina), and the patient presenting signs of threatening collapse, with a scarcely perceptible pulse, I thought it desirable to guard against any further fall of temperature. Hot bottles were applied to the feet, and a hot-water bag was

placed against the back. Within twenty minutes the temperature now rose to 98.2° (vagina). The pulse became perceptible (130); the respirations were 42.

By 1.15 A.M. on June 11th, or within an hour and twenty minutes, the temperature had risen to 99.4° ; the pulse was 118, the respirations 32; she had been partly conscious, and now dozed quietly, though some strabismus was noticed about this time. From 1.15 A.M. to 3.30 A.M. the temperature again slowly rose to 101.8° ; consciousness was apparently restored;¹ the patient took brandy freely, and spoke; the pulse was 112, the respirations 40. From 3.30 A.M. to 7.35 A.M. a gradual rise of temperature continued, reaching at 7.35 A.M. 104.5° . At 7.40 A.M. she was again put into a bath (temperature 64°). Five minutes after her immersion the temperature in the vagina was 105° ; it then began to fall, and in twenty minutes had fallen in the vagina to 103.9° . She was immediately removed from the bath (temperature of bath at patient's removal 66°); but the fall continued for forty minutes longer, reaching 99.4° at 8.40 A.M.; or within an hour of this second application of cold there had been a reduction of temperature of 5.6° Fahr. At 8.30 A.M., while the temperature was 100.8° , there was a strong rigor, which was several times repeated. Hot bottles were again applied, but in spite of these the fall of temperature lasted for ten minutes longer—i.e., until 8.40 A.M.—and amounted to 1.4° within this short time, reaching 99.4° . Deafness from the quinine taken the afternoon before became very distinct about this time, and lasted for forty-eight hours. During the night the patient had, by mouth or enema, about twenty ounces of brandy. The temperature now rose gradually to 100° , but did not rise above 102° for thirty-six hours. During this period the pulse and respiration ratio averaged 96 to 30. She perspired freely, was quite conscious, passed a natural motion and urine of 1014 specific gravity, and had some quiet sleep. Brandy was given, according to the strength of the pulse, in doses varying from two drachms to half an ounce every hour.

¹ Subsequently it was found that the patient remembered nothing of the treatment after the first dose of quinine. Some days later she asked if she had not been very ill.

Some cough now appeared, with purulent expectoration. The lungs were, however, resonant on percussion; but on the following day moist and sibilant râles became general through the lungs. The cardiac friction and apex murmur were entirely unchanged, and there was no increase of the cardiac dulness. The knees now became again slightly painful; the tongue was thickly furred, and she was occasionally sick, but took an abundance of milk, beef-tea, and eggs. Lime-water was given with the milk, and at this time—viz., at 3 P.M. on the 12th, or thirty hours after the last fall of temperature, being the sixteenth day of the disease, the seventh after admission, and the second of this treatment—the pulse becoming weak and increasing in frequency to 120, quinine was again given in doses of five grains every four hours. At 8.50 P.M. on the 12th, or thirty-six hours after the previous fall of temperature, and forty-eight hours after the first rise, this had again risen to 102.1° . In thirty minutes later it had risen to 102.2° , and in order to check a further rise the ice-bag was applied to the spine. Within thirty-five minutes the temperature had fallen to 101.6° , or three fifths of a degree; in three hours it had fallen to 101° , when the ice-bag was removed. It fell another half degree in the quarter of an hour succeeding, and it then again slowly rose with minor oscillations within five hours to 102.4° , when the ice-bag was again applied for three hours, producing within this period a reduction of 1.5° . The ice-bag was then removed, and a slow rise of temperature ensued during three hours and a half to 102.5° , when the ice-bag was reapplied. Its effect this time was less marked. The temperature fell in three hours 1.1° , and continued below 102° for three hours longer; but although the ice-bag was continuously applied, it rose to 102.2° , and remained nearly at this height during the succeeding three hours; then it fell three-tenths of a degree, and oscillated between 101° and 101.9° for eight hours longer, when the temperature being only 101.6° , the ice-bag was removed from the spine, after it had been continuously applied during eighteen hours.

During this period—i.e., on the third day from the attainment of the temperature of 110° —moist râles had appeared throughout both lungs, but had again given way to dry sibilant

râles; abundant muco-purulent expectoration was present. The tongue was still covered with a creamy fur. The pulse had improved greatly in quality, varying in frequency from 100 to 104, while the respirations varied from 26 to 30 in the minute. The deafness disappeared on the beginning of the fourth day, though the patient was still taking quinine in doses of five grains every four hours, or at the rate of half a drachm in the twenty-four hours. The cardiac dulness remained at the level of the third cartilage. The friction continued, and also the apex murmur noticed on the 10th. There was great tenderness over the precordial region.

The patient had taken during each of the past two days eighteen ounces of brandy in the twenty-four hours, and also sixteen ounces of beef-tea, four pints of milk, and seven eggs.

On the fourth day of this treatment (the sixteenth day of the disease) there was some dulness at the base of the right lung; fine and coarse moist râles had again become general throughout the left lung, and there was some blowing breathing over the dull area in the right lung. The moist râles on this side were limited to this part. The temperature on this day (June 14th) varied from 101.8° to 102.8° . During an hour and a half, from 8.30 A.M. to 10 A.M., when the temperature was 101.8° , the ice-bag was applied to the spine *without any effect in reducing the temperature*. Indeed, this rose during the application to 102.1° , or three-tenths of a degree, and it was, therefore, discontinued, and the temperature subsequently fell during the ensuing three hours to 101.3° , after which it gradually rose during eleven hours to 103.2° . At this time the ice-bag was re-applied for six hours, during which period a reduction took place of 1.8° in the temperature, or from 103.2° to 101.4° . when it was removed.

June 15th (the nineteenth day of the disease, and the fifth of this treatment). A great improvement was now observed in the patient's strength: she could turn in bed without assistance; the pulse was 96, slightly dichrotous, but of good volume;¹ the dulness at the right base, noticed twenty-four hours previously, had disappeared, though abundant moist râles persisted

¹ See Sphygmographic Tracing, No. i. Plate I.

at both bases. The cardiac friction continued, but the murmur at the apex had disappeared, and the precordial tenderness had diminished. The bowels had again been opened naturally. She had, in the last twenty-four hours, taken eighteen ounces of brandy, twelve ounces of beef-tea, and seven eggs. The brandy was now ordered to be reduced to twelve ounces in the twenty-four hours.

During the next twenty-four hours there was no further application of the cold. The temperature oscillated between 100.5° and 102.7° . The pulse remained about 96, and the respirations 24.

On the 16th June (the twentieth day of the disease and the sixth of this treatment) the strength was still further improved. The tongue was still furred; but she had, in addition to twelve ounces of brandy, taken two pints of beef-tea, three pints and a half of milk, and seven eggs in the previous twenty-four hours; and had passed a natural stool. There was no dulness over the lungs, and less moist râle; but still some weak breathing at the right base. The pulse (96) was small, but well sustained, and without dichrotism. The cardiac friction was diminished; the apex murmur was faintly audible. She had passed seventy-two ounces of urine. The quinine was reduced to one grain every three hours, or eight grains in the twenty-four hours.

On June 17th (the twenty-first day of the disease and the seventh of the treatment) the temperature fell to 98.4° . On the following day it never rose above 99.1° ; and after this it remained normal, though falling on the 22nd to 97.9° .

On the 18th, though only a week had elapsed since the excessive temperature, the patient sat up in bed, and ate a boiled sole for dinner.

The râles in the back entirely disappeared on the 22nd—the twelfth day after the intense pyrexia, and the twenty-sixth day of the disease. The heart's sounds had now become natural, with the exception of a very faint friction at the base, which disappeared within the following two days. The apex had returned to its natural position, the dulness was at the lower border of the third interspace, and there was no murmur. From this time, though the patient remained feeble for

a few days longer, there was uninterrupted improvement, with the exception that on the 1st of July (the thirty-fourth day) the morning temperature was 100°. This had, however, fallen to 98·5° in the evening; and there was no subsequent relapse. The patient got up, walked about the ward, and was discharged for Eastbourne on the 10th of July—thirty days after the intense pyrexia, and forty-four days after she was first taken ill.

II.

The next case presented much greater difficulties in treatment, and a more obstinate persistence of the pyrexia, though the treatment of this latter symptom was commenced at an earlier period than in the last related. I have, however, no doubts but that within a short time this patient's temperature would have risen to a degree equal to that observed in the first narrated, and would have proved fatal but for the treatment adopted. He had, however, more serious complications—a double pneumonia, with pleuritic effusion also double, and a large pericardial effusion—all existing before the dangerous rise of temperature took place; and, probably in consequence of the latter condition, the case was more protracted.

CASE II.—Allen Caley, aged thirty-six, admitted into University College Hospital June 6th, 1871. Is a coachman; single; has lived well; not in the habit of drinking; never had syphilis. No other previous illness. No hereditary predisposition. The present (his first) attack of rheumatic fever began apparently on May 26th, in consequence of exposure. He had then pains in the back and joints, perspired freely, and had rigors on several successive days; but was able to attend at St. Mary's Hospital as an out-patient during the whole week previous to his admission to University College Hospital, on the eleventh day of the disease.

The first notes of his case are on the 7th June, when friction was heard over the heart. He was then placed under the treatment by *tr. ferri perchloridi* \mathfrak{m} xxx. every three hours. On the following day (the thirteenth of the disease) he had pains in the elbows and hands on both sides, in the right shoulder, and in the

left knee and ankle. He perspired freely. The tongue was furred. The heart's apex was in the fourth interspace, half an inch outside the nipple; and the cardiac dulness extended to the lower border of the second left cartilage. On this day the patient began to cough. This was attended with a thin mucoid expectoration, streaked with blood; and on examination there was found to be dulness at the right base extending as high as the angle of the scapula, with weak breath-sounds. On the following day (June 9th—fourteenth day of the disease, third day in hospital) the left base was also affected, and bronchial breathing with fine crepitation was heard at both bases. The patient was very prostrate, and perspired profusely. The joints first affected were better, but the right knee was now swollen and painful. The urine throughout this period had been free from albumen, sp. gr. 1021 to 1025, acid, and high-coloured.

The temperature from his admission until the 12th June (the seventeenth day of the disease) varied from 102° to 104.4° Fahr.; it only reached the latter point on the evening of the 8th, when the patient began to cough, and when it may be presumed that pneumonia was commencing. There was, however, no variation in the pulse-respiration ratio (90: 27—100: 26) previously observed, until the following morning, when they were respectively 104 and 40. The temperature did not, however, during the two succeeding days maintain the same high standard; on the following morning it was only 102.8° , and it did not again rise above 103.1° until the evening of the 12th of June.

On the morning of June 12th (the seventeenth day of the disease and the sixth after his admission to the hospital) there was no material change in his general state. The morning temperature was 102° ; pulse 104; respiration 36. At 8 P.M. of this day he became delirious. At 9 P.M. the temperature was 105.6° ; at 9.5 it was 105.7° ; and at 10 o'clock 105.8° . He was now given half a drachm of quinine in a single dose in powder. No further rise of temperature ensued for two hours and twenty minutes; but in the succeeding hour (from 11.10 P.M. to 12.20 A.M.) it rose nine-tenths of a degree, or from 105.7° to 106.5° ; and in another hour it rose another half degree, attaining 107° Fahr.—a rise of five degrees in fifteen

hours. During the last four hours the patient had been more or less constantly delirious, though capable of being roused when spoken to, and once answering rationally—giving the address of his relatives; this however, was done with difficulty. (He gave the address wrongly, and voluntarily corrected himself.) He appeared to have no pain. Though he had on previous days perspired freely, the skin was now dry. The face was flushed, and dusky in tint, though not so cyanotic as in the last case. The eyes were suffused and injected. The *alæ nasi* acted strongly. The pulse was jerking, irregular in rhythm, but not intermitting, 100 to 108. The respiration varied from 44 to 46. The tongue was dry and brown.

At 2 A.M. on the 13th, when the temperature was 107° , he was put into a bath at a temperature of 89° Fahr., which was gradually cooled during twenty-five minutes to 86° . He remained twenty-five minutes in the bath. During this period the temperature in the rectum fell from 107.3° (the height observed after he had been six minutes in the bath) to 103.1° , or a fall of 4.2 degrees. The pulse in the bath had fallen to 90. He passed a loose motion in the bath, but while in it he became perfectly conscious. The pulse became full and incompressible. The sense of dyspnoea diminished. At 2.33 A.M., ten minutes after his removal from the bath, the temperature in the rectum had fallen to 99.1° , a diminution of four degrees: the pulse was 84, the respiration 36. In fifteen minutes more the temperature had fallen to 98° , or another degree; the pulse was 80, and the respiration 20 in the minute; he was perfectly rational and conscious. Hot bottles were then applied to the feet and warmth to the back. During the last three hours three ounces of brandy had been given. Eighteen minutes later, in spite of the external warmth, the temperature in the mouth had fallen to 97.8° , a total reduction within an hour of 9.5 degrees. He then went to sleep for nearly an hour and a half, during which period the temperature rose two degrees, or to 99.7° , when the hot bag was removed. At this time the state of the heart was found to be the same as on the 8th and 9th, or four days previously. The pulse was 100, full, regular, and strong; the respirations 32. It did not appear advisable to give him the fatigue of examining the lungs posteriorly. There

was no perspiration. During the two hours succeeding, the temperature gradually rose to 101.9° (2.2 degrees), and the ice-bag was then applied to the spine, but with very little effect on the temperature, which oscillated during nearly three hours, while the application was continued, between 101.2° and 102.2° —finally, however, falling to 100.9° —a reduction of one degree—when the ice-bag was removed. At 10 A.M. on the morning of the 13th (the seventh day after his admission, the eighteenth day of the disease), he had slept more or less continuously since 3 A.M.; the pulse was 82, jerking; respiration 36; tongue moist, with a thin white fur; patient was a little deaf from the quinine given the afternoon before. From 10 to 11.40 A.M. the temperature rose from 100.9° to 102.5° , or 1.6 degrees. The ice-bag was then reapplied, but there was no reduction of temperature for more than six hours, when at 6.15 P.M. it had fallen to 100.9° . During the whole of this period it oscillated from 102° to 102.8° . The pulse-respiration ratio maintained an average frequency of 84:32. The bowels acted naturally. The patient was conscious, comfortable, and composed, without pain, though very prostrate. (There is an omission here in the notes as to when the ice-bag was removed.) Within an hour of the last fall of temperature (or from 6.15 P.M. to 7.15 P.M.) it had again risen 1.3 degree (from 100.9° to 102.2°).

The ice-bag was now applied continuously to the spine for fourteen hours, from 7 P.M. to 9 A.M. on the 14th. The temperature during the whole of this period oscillated between 101.8° and 102.8° , but only remained below 102° during the last three hours of the application, and it never fell below 101.8° .

At 9 A.M. on June 14th, after thirty-two hours of this treatment (the nineteenth day of the disease and the eighth after admission), the heart's apex was undiscoverable, and the dulness had risen to the first rib. There was intense friction at the base, and a loud double murmur at the apex, the nature of which, whether exo- or endo-cardial, was doubtful. The heart's sounds were exceedingly irregular, more so than the pulse. The patient coughed much, with distinctly rusty sputa. Both bases were dull, but the level of dulness was not further elevated. There was weak breathing at both bases, with pleural

friction. The tongue was covered with a creamy fur; the patient was very tremulous; the pulse was weak, varying from 100 to 84; respirations 36. Since the preceding evening the patient had taken thirty grains of quinine, in doses of ten grains at intervals of four hours, a considerable quantity of brandy (six drachms every half hour) and abundance of beef-tea and milk. He had passed a large quantity of pale urine, sp. gr. 1008, acid reaction, no albumen nor sugar; the urine had a peculiar odour, like that of diabetic urine. Ordered to discontinue the quinine *pro tem.*; to continue the brandy, six drachms every half hour. During this day the temperature from 10 A.M. to 4 P.M. varied from $101\cdot5^{\circ}$ to $102\cdot8^{\circ}$; the pulse was from 80 to 82, and very dichrotous: the respirations from 30 to 44. At 4 P.M. the ice-bag was reapplied, when the temperature was $102\cdot6^{\circ}$, and was retained for three hours and three quarters (until 7.45), when the temperature had gradually fallen to $100\cdot1^{\circ}$, or $1\cdot5$ degree. At 8.30 P.M. of the same day I found that the cardiac dulness extended to the clavicle. The apex could not be felt. The sounds were excessively irregular and confused. Loud friction could be heard, and strong friction fremitus was felt over the whole cardiac region. The pulse was intensely dichrotous. The patient was excessively prostrate and tremulous. The tongue was more furred; but his manner was calm, natural, and composed. There was a slight return of pain in the joints, but no perspiration had taken place since the 12th—i.e., during the past forty-eight hours. A blister two inches square was ordered to be applied over the heart. From 8.30 P.M. to 11 P.M. the temperature remained below 102° . After this time it rose during four hours and a half, or until 3.30 A.M. of the 15th, to $103\cdot6^{\circ}$.

The ice-bag was now reapplied to the spine for five hours and a half—i.e., until 9 A.M. No appreciable effect was produced by it on the temperature during the first three hours, but this fell during the remainder of the period of application to $102\cdot7^{\circ}$, or nine-tenths of a degree, and the ice-bag was then removed. The temperature rose again within an hour and a half to $103\cdot4^{\circ}$, and remained above 103° nearly the whole of this day—falling, however, on two occasions (at 4 and 9 P.M.) to $102\cdot9^{\circ}$.

There is an omission in the memoranda here as to whether the ice-bag was applied during the last-named period, but I find it noted at 4 A.M. on the following morning that the ice-bag was refilled, and I believe that it was continuously employed.

During this day (June 15th, the twentieth day of disease and the third of treatment) the patient's prostration was extreme; but at one time a little perspiration appeared. The bowels acted naturally, with a semi-formed motion. Brandy was given in doses varying from three drachms to half an ounce every half-hour. The pulse varied from 100 to 90, and was excessively dichrotous; the respirations from 36 to 32.

During the night of June 15th—i.e., after seventy-two hours of this treatment—the temperature remained stationary at $103\cdot4^{\circ}$ during three hours; and though during the whole of this period, and subsequently for an hour and three-quarters, an ice-bag was continuously applied to the spine, it rose half a degree in the succeeding hour; and in the next forty-five minutes it rose rapidly $1\cdot5$ degree, reaching $105\cdot4^{\circ}$ at 4.49 A.M. on the 16th. The patient was placed in a bath of 96° Fahr. at 4.47 A.M., and a rise of two-tenths of a degree followed his immersion. He was kept in the bath three-quarters of an hour, the temperature of which was gradually artificially lowered from 96° to 78° . During this time a gradual reduction of the patient's temperature ensued of $2\cdot8$ degrees, or from $105\cdot4^{\circ}$ to $102\cdot6^{\circ}$. It fell seven-tenths of a degree more within five minutes after his removal, and continued sinking for another twenty-five minutes, when it had reached $98\cdot7^{\circ}$; or within an hour and ten minutes the temperature had been reduced by $6\cdot7$ degrees. It then gradually rose, during the succeeding two hours, to $102\cdot4^{\circ}$ ($3\cdot7$ degrees), when the ice-bag was re-applied; but in spite of this application, which apparently produced no effect, it rose $1\cdot8$ degree in two hours more, reaching at 10 A.M. on the 16th $104\cdot2^{\circ}$. Soon after his removal from the previous bath, the temperature of which was $99\cdot5^{\circ}$, some perspiration was observed on the face.

He had taken in the last twenty-four hours twenty-eight ounces of brandy, three pints of beef-tea, four pints of milk, seven eggs, and three bottles of lemonade. The tongue was

much cleaner. The pulse had, however, increased in rapidity from 84 to 120, and it was jerking and dichrotic; respiration 38 to 44. He was ordered to resume the quinine in doses of two grains every hour.

On June 16th (the fourth day of treatment, the tenth day after admission, and the twenty-first day of the disease), at 10 A.M., when the temperature had risen, as before stated, to 104.2° , he was again placed in a bath at 95° , and retained there for forty-five minutes, while the temperature of the bath was gradually lowered to 86° Fahr. While in the bath the temperature in the rectum fell 2 degrees; and it fell 1.8 degree more in the half hour after his removal, viz., to 100.4° (mouth), when it slowly began to rise. A total reduction of 3.8 degrees was thus effected in less than an hour and a half, three-quarters of an hour only having been passed in the bath.

Seeing that the temperature threatened again to rise, and being desirous that this should be checked at once, and having on the last occasion found that the ice-bag to the spine had failed in doing this, I had the patient packed in the wet sheet wrung out of ordinary cold water (probable temperature about 60°); temperature of ward 72° . He was kept in this for two hours; but in spite of it, the temperature had risen to 102.4° , or 1.6° degree, though a reduction of four-tenths of a degree was observed during the first half-hour.

He had in the last eight hours taken ten grains of quinine. The tongue was more furred; the pulse was 120, dichrotous, and very irregular. In an hour and a half more after his removal from the pack, the temperature had further risen 2.1 degrees, viz., to 104.5° .

The patient was now placed in a bath of 101° , and kept there during three hours and ten minutes, or from 3.20 to 6.30 P.M. In the first twenty minutes of this time the bath was gradually cooled to 86° —i.e., until the patient's temperature began to fall; it was then gradually warmed during the ensuing hour and a half to 98° . The temperature of the bath was 100° for a few minutes; but it was again cooled to 97° , when the patient was removed.

The effect of this bath on the patient was as follows:—During the first fifteen minutes of his immersion the

temperature in the rectum rose eight-tenths of a degree—reaching 105.3° . It then gradually fell during two hours to 100.2° , a reduction of 5.3 degrees, while the bath was being warmed to 98° ; and then rose during the succeeding hour to 102.3° , when the patient was taken out because he complained of a feeling of exhaustion and shortness of breath, and of pain in the right side. The pulse during this period varied from 100 to 120; it was bounding and very dichrotous. The respiration was 42 to 44. After he had been an hour in the bath while the temperature of the water was 92° , and the patient's temperature in the rectum was 100.8° , he had a slight shivering fit, which was not repeated. He took brandy and food as usual while in the bath, and had an ounce of brandy given him on his removal to bed.

At this time (June 16th, the fourth day of treatment) some cedema of the hands was first noticed. (This increased much subsequently.) The patient now had some quiet sleep; but in an hour and twenty-five minutes the temperature had risen half a degree (from 102.3° to 102.8°), and the ice-bag was re-applied for two hours, during which the temperature rose to 104° and then again fell to 103.7° . A great increase in the cardiac dulness was noticed at this time. It filled the whole left front from apex to base. The patient's extreme weakness prevented any examination of the back. The respiration was suppressed in the dull area. At the acromial angle and upper axilla alone could any breathing be heard; here it was weak blowing.

Two hours later the patient was again put into a bath for fifty minutes: temperature of bath on immersion, 100° , gradually cooled to 77° . This reduced the temperature in the rectum 2.5 degrees (from 104.6° to 102°); and it was followed by a further fall during fifty-five minutes of 4 degrees, the temperature (mouth) now reaching 98° . A rigor then took place, and external warmth was applied. The temperature rose gradually, during three hours and a half, to 102.6° , when he was again put into a bath at a temperature of 81° . Five minutes after immersion the temperature in the rectum was 103.8° (i.e., it had apparently risen 1.2 degree, but the previous one was taken in the axilla). Thirty minutes in this bath reduced the temperature in the rectum one degree—namely, to 101.6° ; that of the bath rose two degrees. The

temperature then fell in fifty minutes to 98.2° (axilla), but it rose gradually during the ensuing two hours to 102° (or 3.8 degrees). Some moisture of perspiration was now observed on the face. He was now packed in the wet sheet: this had the effect, within forty minutes, of reducing the temperature 1.1 degree, but it rose in the ensuing hour 1.3 degree (to 102.4°), when the pack was renewed, with the effect of reducing the temperature in forty-five minutes by one degree.

June 17th (the twenty-second day of the disease, the fifth day of this treatment, and the eleventh day in hospital).—9.15 A.M.: The dulness had diminished in the left side. The acromial angle and upper axilla were resonant. The dulness was pyramidal, and had diminished in transverse diameter since the day before; for whereas then the whole infraclavicular region was dull, the loss of resonance now extended only to the cartilages of the first and second ribs, and only slightly beyond the cartilage of the third rib on the left side. The respiration was natural at the acromial angle and upper axilla on the left side, but ceased almost absolutely at the fifth rib in the axilla, with a little distant tubular breathing below this. On the right side, dulness existed at the fifth rib, mammary region, sixth rib in axilla. The respiration in the right front was good to the level of the dulness; below this it was suppressed. No râles audible. The patient had taken in the last twenty-four hours twenty-four ounces of brandy, two pints of beef-tea, and four pints of milk. He had also taken a grain of quinine every hour. He was very tremulous; his manner was agitated; he dozed occasionally, but felt easier, and had less sense of dyspnoea; pulse 104, very dichrotous; respiration 36. At 10 A.M., temperature 102° ; at 11.35, 102.2° . He was then put into a bath at a temperature of 91° , and retained there thirty-five minutes, while the temperature of the bath was reduced to 75° . During the first seventeen minutes after immersion the temperature in the rectum varied from 103.2° to 103.4° (the previous temperature was taken in the mouth). It then fell to 101.4° in the rectum (or 3.2 degrees), when he was removed from the bath, but it continued to fall for an hour to 98.6° (in the mouth), when the patient had a shivering fit. In thirty minutes more it had risen to 100.1° .

in the mouth. The pulse was 96, the respiration 24. The patient was very weak, and was given an ounce of brandy every half-hour. He was now put into a pack, changed every half-hour, for four hours and a half. The temperature during this time oscillated between 100.6° and 101.6° in the mouth. During three hours of this time he took six ounces of brandy. The temperature in the next hour reached 102° , and the pack was renewed every twenty minutes. The patient's exhaustion was extreme. Tracheal râle appeared, but he was conscious when spoken to. Brandy was continued—an ounce every half-hour.

For the succeeding twelve hours and a quarter—from 7.40 P.M. on the 17th, to 8 A.M. on the 18th (the sixth day)—he was kept constantly in the wet pack, or in towels wrung out of iced water, and changed frequently. During this period the maximum temperature was 102.3° , the lowest 100.2° (all taken in the mouth). The pack was then discontinued for three hours, and no rise of temperature ensued.

June 18th (sixth day of treatment).—Has taken in the last twenty-four hours thirty-three ounces of brandy, four pints of milk, a pint and a half of beef-tea, a grain of quinine every hour, and three doses of three minims each of tincture of opium. Tongue cleaning; bowels have acted naturally; cardiac dulness as yesterday; dulness of right front diminished, now reaches the sixth rib; respiration decidedly freer. Patient stronger; can turn himself in bed. Pulse less dichrotic to feel; still intensely so by sphygmograph—108. Respiration 44. The pack was resumed at 12 noon, the temperature having risen to 101.6° , and continued till 8.30 P.M.; sometimes wrung out of ordinary water, sometimes wrung out of iced water. The temperature of the patient oscillated (in the mouth) between 100.5° and 102.5° ; the latter only once. At 8.30 P.M. the temperature was 100.8° . The patient had had two natural motions during the day. The pulse was still 110; the respiration 28. The chest, now examined, showed that both sides of the back had become resonant to within a hand's-breadth of the base. There was some friction at the level of dulness, and weak breathing without râle was heard here. Above the dulness the respiration was natural. Heart as

before. Breathing laboured; but no sense of dyspnoea. Tongue rather dry; patient quite conscious; felt comfortable. During the whole of the ensuing night the patient remained without the cold applications, and the temperature never rose above 101.8° , and during the latter four hours remained below 101° , the minimum being 100.4° (in the mouth). He continued to take two grains of quinine every hour.

On the following day, June 19th (seventh day of treatment, twenty-fourth of the disease, and thirteenth day in hospital), the cardiac dulness had fallen to the level of the first rib mid-sternum. There was a little subsultus tendinum, the pulse was still dichrotous, and cedema of the hands persisted. He was calm, and quite collected. He had taken in the last twenty-four hours thirty-two ounces of brandy, and nourishment as before. He had slept well during the past night, and had perspired freely on the face and body. At 11 A.M. he sweated profusely; temperature 101.9° . The perspiration then ceased, and the temperature rose, till at 12.50 P.M. it was again 102.8° . He was then put into the iced pack, and kept in it for three hours, with a reduction of temperature to 100.8° . The pack was then discontinued, but the temperature rose within three hours to 102.9° , when he was put into a bath at 97° , and retained there for thirty minutes, while the bath was cooled to 86° . During the first twenty minutes of the bath the temperature rose to 103.5° , or $.6$ of a degree. It then fell to 102.2° , but the patient shivered, and felt great oppression of the chest and shortness of breath, and he was consequently taken out. The temperature fell for seven minutes after his removal from the bath, but it rose again immediately, and in three hours and a half it had reached 103.3° . On examination of the chest both bases posteriorly were now found to be perfectly resonant. The respiration was freer, but there was abundant friction at both bases. The hands were much swollen. The breathing was very laboured, and he complained of pain behind the sternum, and much cough. Pulse 112; respiration 28. The pack was now resumed, and continued during nine hours, being changed every half hour. Under its influence the temperature steadily fell, without any marked oscillations, from 103.3° to 100.7° , or 2.6 degrees; when the

pack was left off for an hour, during which the temperature rose 1·5 degree, to 102·2°, and the pack was resumed for half an hour. At 10 A.M. the temperature had again fallen to 100·8°.

At 10 A.M. on the 20th (eighth day of treatment, fourteenth day since admission, twenty-fifth day of disease) there was considerable œdema of the hands and feet, and some puffiness of the eyelids. The pulse was 106; respiration 24. The pulse was dichrotous. The breathing was deep, quiet, and regular. He had had two loose motions in the last four hours. There had not been throughout any albumen in the urine (retained for quantitative analysis.) Patient had taken twenty-four ounces of brandy in the last twelve hours. The quinine was now omitted temporarily, and the cold applications were never resumed.

The subsequent progress of the patient was as follows: He still remained in a state of excessive prostration, and for three days more took from twenty-four to twenty-nine ounces of brandy in the twenty-four hours; this was then on successive days reduced to nineteen and eighteen ounces. He continued to take the latter quantity daily until the 11th July, when it was reduced to sixteen ounces, and on the 25th July to ten ounces.

The temperature on the 20th of June, when the pack was omitted, oscillated between 101·6° and 103·1°, but only once reached this standard; the majority of the temperatures varied from 102° to 102·8°. In the following night it varied between 101·2° and 102°, being generally at or below 101·7°.

On the 21st (the ninth day of treatment) he began to perspire profusely, and complained of pain in the right knee, and felt very ill and weak: œdema persisted in the face and hands. The temperature varied from 101·9° to 103·6°; it was commonly above 102°. The cough was troublesome, with purulent bronchitic sputa. The chest was clear, except at the extreme bases, where there was some dulness, and where friction was heard, together with moist râles. The pulse maintained a pretty uniform frequency of 112; respiration 32. He was ordered one grain of quinine every hour.

June 22nd.—During the ensuing twenty-four hours, until

the tenth day of treatment and the twenty-seventh of the disease, the temperature varied from 102.3° to 103.7° . He perspired freely. Both knees and the right hand became painful, and the patient complained much of weakness and discomfort. The sputa on this day became clear and frothy; cedema persisted in the hands and feet, and slightly in the eyelids. He continued to improve during the following day, the temperature only once reaching 103° , and falling gradually till, on the morning of the 24th, it had reached 100.7° .

24th (twelfth day of treatment, twenty-ninth day of disease).—Patient felt much better. He had continued to perspire freely, but he had no pain in the limbs. The cardiac dulness had fallen to the upper border of the third cartilage. There was intense friction over the whole cardiac region. The cedema of the eyelids and hands had diminished, but some still persisted in the feet. He had taken the quinine regularly. The tongue was nearly clean, and he ate a boiled sole for dinner. The pulse was 108, and still intensely dichrotous.

The pyrexia now gradually diminished; but the temperature only fell to normal, 98.4° , on the morning of the 8th July, the twenty-sixth day after the extreme pyrexia and the forty-third of the disease; and evening, and sometimes morning, exacerbations, varying from 99° to 102° , occurred occasionally until July 26th, or the sixty-first day of the disease. The patient, however, got up and walked about on the 19th July.

The cardiac condition gradually improved. The apex first became perceptible in the fourth interspace outside the nipple, then fell to the fifth interspace outside the nipple, and on the 28th July, when the patient was ordered to Eastbourne, it remained in the fifth interspace, vertically below the nipple. Friction had, however, disappeared on the 13th July, and no cardiac murmur remains. The upper border of the heart's dulness did not return to its natural level (the fourth rib) till July 13.

The lungs became quite resonant everywhere, but some friction remained at the right base as late as July 5th. The cedema of the hands and feet had disappeared on June 26th, the thirty-first day of the disease. Slight rheumatic pains

continued and recurred in the joints as late as the 10th of July.

He took a grain of quinine every four hours up to the 10th of July; afterwards it was taken every six hours. He began to take cod-liver oil about the 1st July.

On July 16th, the first day he was able to stand, his weight was 8 st. $1\frac{1}{2}$ lb. On July 24th, though there had been occasional slight pyrexia in the interval, he weighed 8 st. 6 lb., being a gain of $4\frac{1}{2}$ lb.

COMMENTARY.

I HAVE narrated these cases *in extenso* because all the phenomena associated with a very active system of treatment, when first applied to any disease, deserve most careful study. It will at once appear that there is a great difference between these two cases in regard to their progress subsequently to the high pyrexia, and with respect to the amount of treatment required to bring them to a successful termination. The female patient, who had a temperature of 110° , was practically out of immediate danger in less than twenty-four hours, and only required two baths, with an interval between them of nine hours, in order to avert all urgent risk of a further rise. At least in her case the subsequent occasional application of the ice-bag to the spine, during three days more, sufficed to maintain the temperature below 103° , and for the most part below 102° , and the fever entirely ceased after seven days.

The man, on the other hand, whose temperature at the commencement of this treatment did not exceed $107\cdot3^{\circ}$, required almost continuous cold applications, extending over a period of eight days, to produce the same result; and during this time he was placed on eight occasions in the bath for periods varying from twenty-five minutes to one hour and ten minutes; and in the intervals between these he was subjected to a, comparatively speaking, almost continuous application either of the ice-bag to the spine or of the wet pack. In the short intervals while these were discontinued there was also, during these eight days, a constant tendency to a rise of temperature to or above 103° , and

reaching on two occasions on the fourth day $105\cdot4^{\circ}$. Even on the eighth and ninth days, and after the cold applications were discontinued, the temperature rose to $103\cdot7^{\circ}$ and $103\cdot6^{\circ}$, and it only finally regained the normal standard thirty-one days after this treatment was commenced.

The value of all therapeutic measures is ultimately purely a matter of experiment, and dealing as I was with an entirely new set of conditions, at least as regarded this disease, many of my measures must be looked at solely in this light; but I shall endeavour to state what conclusions I have felt may be drawn from them for the guidance of others.

There are however, I believe, in the present condition of medical science, two most important primary questions always to be answered before any active treatment is resorted to in acute disease; and these are, what is the natural tendency of the affection generally, and also under special circumstances, when left without treatment, either to recovery or death?—and further, what is the influence of any method of treatment either in promoting the former or in averting the latter? We have had more than enough in times past of so-called active treatment blindly pursued in the hope of eradicating acute diseases, which proceed better to recovery without such measures. Acute rheumatism itself affords one of the best illustrations how little medicinal agents, indiscriminately employed, are capable of shortening its duration or favourably influencing its course; and a still more striking example of this proposition is found in the past history of the treatment of acute sthenic pneumonia, the evidence in regard to which cannot, however, be considered here.¹ With regard to acute rheumatism, evidence sufficient is to be found in Dr. Gull's and Dr. Sutton's analysis of the results of its treatment, published in the *Medico-Chirurgical Transactions*,² to show that no single method of treatment hitherto adopted has the slightest *specific* effect on the natural course of this disorder; and the same may, probably, be affirmed with equal truth of the whole class of the acute febrile diseases, with the exception of ague. I believe,

¹ I have treated of this subject at some length in vol. iii. of *Reynolds' System of Medicine*.

² Vol. ii.

however, that individual cases may be advantageously treated by different methods, according to the indications which they severally may present; the remedial agencies at our disposal being thus varied by the circumstances of each case. Nor do I think that the general truth just stated should be any bar to our testing the utility of new methods specifically (in one sense) directed against the disease; and for this reason I am making use of the method of treatment of acute rheumatism by perchloride of iron, as proposed by my friend Dr. Reynolds, but on the merits of which I am not on the present occasion about to make any further commentary, as it will require to be tried on a large scale before its effects can be fully ascertained.

The fact that both these cases were thus treated affords no argument against the use of iron in acute rheumatism; for although, in addition to them, one of Dr. Reynolds' cases also died with the same phenomena, and also one previously under my care who had in the earlier stages been treated with the same remedy, this mode of termination is by no means peculiar to this method. It has been known to occur in acute rheumatism under indifferent treatment, or by simple salines or blisters in Drs. Ringer's,¹ Weber's,² Murchison's,³ and Sanderson's,⁴ and in Mr. Anderson's⁵ cases, and in two others under my own care; or by colchicum, as I have seen in another case; also under the treatment by calomel and opium and veratria (my own), and by digitalis (Meding): further, it is not peculiar to rheumatic fever, and it may be the mode of termination of most of the acute febrile diseases—pneumonia, variola, typhus, typhoid, puerperal fever, pyæmia, tubercular meningitis, and of injuries to or diseases of the brain, and it may also result from exposure to great heat.⁶

To the question, After what degree of temperature attained by the body in febrile states is recovery naturally possible

¹ *Med. Times and Gaz.* 1867, ii.

² *Trans. Clin. Soc.* i.

³ *Ibid.*

⁴ *Ibid.*

⁵ *Brit. Med. Jour.* 1870, i. 528.

⁶ See Wunderlich, *Die Eigenwärme in Krankheiten*. Dr. Bäumlér, quoted by Weber, *Trans. Clin. Soc.* i. and ii. Quincke, *Berliner Klin. Woch.* 1869, vi. 301. Also Dr. Gee's *Gulstonian Lectures on Pyrexia*, in the *Brit. Med. Jour.* 1871, i. See also Dr. Levick, *Pennsylvania Hosp. Rep.* 1868. The effect of heat in producing Hyperpyrexia appears to have been observed by Dr. Dowler, of New Orleans, as early as 1845.

without medical interference? it is less easy to give a positive answer. Wunderlich¹ gives a diagram of the temperature during a rigor reaching 108·3° Fahr.; but the disease is not mentioned, nor is the subsequent course narrated. Ague, on the same authority, may give a temperature of 106·7°, or more; relapsing fever 107·3°, or more; and recovery in the latter disease has been observed by Dr. Obermeier² after a temperature of 108·5° has been attained. A case of typhoid fever has recovered after attaining the temperature of 107·8°, but Wunderlich regarded this as an exceptional circumstance.³ A case of pyæmia lived six days after reaching 107·6°, but ultimately proved fatal;⁴ and a case of tubercular meningitis was observed by him to live several days after reaching, but not maintaining, a temperature of 106·5°.⁵ Bartels succeeded in artificially raising the temperature of the human body to 107·5° in a vapour bath when syncope supervened. The highest recorded temperature after which recovery has taken place (with the exception of relapsing fever) with which I am acquainted, was one observed by my friend and relative, Dr. E. Long Fox, of Clifton,⁶ when, in a case of tubercular pneumonia, the temperature rose suddenly from 105° to 108°, and then suddenly fell to 104°, and continued to fall subsequently. Recovery has been observed in pneumonia after 107° has been attained.⁷ Cases have, however, proved fatal in these sudden rises of temperature, before so high a standard has been reached. Thus Wunderlich gives two diagrams of fatal terminations at 105·8° and 106°,⁸ and tubercular meningitis may prove fatal under the same circumstances at 105·9° and 106·7°.⁹

Variations probably also exist in this respect in different diseases; and the most important question in relation to the present cases now under consideration is—What is the maximum temperature that can be attained by acute rheumatism to be followed by recovery under indifferent treatment? I put the

¹ *Loc. cit.* p. 165.

² Virchow's Jahresbericht, 1869, ii. 232.

³ *Loc. cit.* p. 13.

⁴ *Ib.* table vi.

⁵ *Ib.* table vii.

⁶ St. George's Hospital Reports, 1869, p. 71; 'Clinical Observations on Acute Tubercle,' Case VI.

⁷ Kocher: Die Behandlung der croupösen Pneumonie mit Veratrumpräparaten. Würzburg, 1868.

⁸ *Loc. cit.* p. 260.

⁹ Quincke, *loc. cit.*

question in this form, because an absolutely correct answer to it would be the surest guide to the time at which it would be proper to commence an active interference with the natural course of the disease; but at present this does not appear to be certainly known. In fact, our thermometrical studies are as yet, perhaps, too recent to allow of such a positive answer to be returned; and it is, indeed, to Dr. Ringer that the merit is almost exclusively due of having first directed the attention of the profession to the thermometrical phenomena attending this mode of a fatal termination in acute rheumatism, and thus of having given us what has proved to be the most valuable guide to the preservation of life in these cases.

As absolute facts, it may, however, be stated, that two of Wunderlich's cases of this nature terminated in death with a temperature of 106.5° and 106.88° .¹ Most of the recorded fatal cases of hyperpyrexia in acute rheumatism, with the exception of the one before treated by me with bleeding and cold baths,—who, after presenting a temperature of 109° , finally died with a temperature of 104.4° from exhaustion—have attained a much higher degree of temperature— 108.8° to 111° . I believe, however, that the power of sustaining life after an excessive temperature has been attained is less in acute rheumatism than in some other diseases; and as far as my own observation has yet gone, I have not known one recover after 106° ; and, indeed, cases of this disease ending in recovery very rarely attain a temperature of 106° ,² which is, comparatively speaking, not very uncommon in typhoid fever. This being the case, and until further evidence has been afforded of the natural powers of the system to resist a high temperature in this disorder, I should regard 107° as the extreme limits to which the temperature should be allowed to rise before the external employment of cold is commenced. It appears to be safe to wait as long as this—at least, judging from the experience of my three cases

¹ *Loc. cit.* table vii.

² I have not, indeed, known a case recover after 106° . One case lived three days after this had been attained, the temperature falling in the interval to 103° , the patient dying finally of asthenia. Dr. Murchison (*The Lancet*, vol. i. 1870, p. 725) has, however, known a case of acute rheumatism recover after attaining a temperature of 106.5° ; but he regards this possibility as very exceptional.

and of one by Dr. Meding.¹ It must, however, be remembered that after, and indeed before, this temperature has been attained there may be little time to spare. Of twenty-two cases² which I have been able to collect of this series of phenomena, the total duration from the first rise, and from a temperature varying from 102° or 105° to 109°, 110°, or 111°, was in one case only two hours (103·5° to 109°); in another four hours and a half (104·8° to 109°); in another seven hours (105° to 110°); in another eight hours (102·2° to 109·5°). In eleven others the periods of the total rise varied from nine and a half to sixteen hours; in two a period of twenty-four hours appears to have thus elapsed. The last rise may, however, be extremely rapid, though in one case it lasted ten and in another fourteen hours from the time the temperature had reached 107° to death at 110°; but in one case death took place at 110° within three hours of the first delirium; three others occupied little more than three hours in rising from 106° to 109·8° and 111°; while in four others six or seven hours were required for this elevation to ensue. After 108° has been reached, a period of three hours may elapse before death at 110° or 111°; but this rise may only occupy one hour and three-quarters; and after 108·5° has been surpassed death may be very rapid, though life has been prolonged for one hour after 110°, and in one case for two hours, in two for an hour and a half, in another for one hour, and in another for forty minutes after 109·4°; yet death may ensue within twenty minutes from the time that the last-named temperature has been reached. In some cases oscillations appear to take place while the rise is progressing, but these are generally slight in degree, and the falls which thus take place seldom amount to 1° Fahr.: they are shortly followed by a further continuous rise, and must not be allowed to excite fallacious hopes of improvement, or to diminish the vigilance with which such cases should be watched.

¹ Archiv für Heilkunde, 1870, xi. 467. In this case, to be hereafter alluded to, the treatment was commenced by cold affusion and iced enemata, when the temperature was 108·6°. I have only met with this report since the two cases last under my care have recovered. Dr. Meding's case was treated successfully in 1870. My first but unsuccessful case was in 1869. I am extremely glad to be able to adduce corroborative and independent testimony to the success of this treatment.

² See tables, Appendix.

In one case, which occurred in my practice last summer, I was prevented from employing the remedial action of cold by the rapid rise of the temperature and the delay of the nurse in sending for me. The case had been a severe one,¹ and had several times shown a temperature of 104° , and on two occasions it had before reached 105.4° and 105.2° . On the morning of the day before the death of this patient (a man aged thirty-five) the temperature was 102.7° ; the same evening, 105.4° . At 4 A.M. it was 106.2° , at 6 A.M. 109.3° ; but I was not sent for until 7 A.M. I reached the hospital at 7.45; but the temperature was then 111.6° , and the patient died at 8 A.M.—two hours after a temperature of 109° , and four hours after a temperature of 106° had been attained.

The main indication of danger is, I believe, a rapid rise of temperature; but I regard the cessation of perspiration while the temperature is still high, and the disappearance of the pains in the joints, as symptoms of very great gravity. All the cases terminating fatally with high temperature which have come under my observation have presented this combination of symptoms, and I find it recorded in several others. Sweating had been profuse in many of these before the fatal rise, and in several the abundance of sudamina and miliary vesicles was a very prominent symptom. In one case reported by Mr. Anderson,² the cessation of perspiration was noticed, on three successive days before the fatal issue, to be followed by delirium, which disappeared on the return of the perspiration.

Vomiting has been observed in three cases out of twenty-one, but it does not appear to be a common symptom of this state.

Delirium is also a sign of danger, but it may occur when the temperature is 103.4° , and when no subsequent rise has followed; but, as Dr. Ringer has remarked, two classes of nervous symptoms characterise these cases: in the one a semi-comatose condition is observed, in the other delirium; and each of these forms is illustrated in the two cases which I have narrated.

A cyanosed condition, probably arising from the rapid accumulation in the blood of the products of the destruction of the

¹ Case IV. Appendix.

² *Loc. cit.*; also tables, Case XIII.

tissues, is not uncommon. The passage of a large quantity of pale urine of low specific gravity has also been comparatively frequently observed;¹ and I have known it to occur on several days preceding death.² A sudden increase of the frequency of the pulse without demonstrable increase of cardiac mischief should in adults excite suspicion; and the same is true of accelerated respiration without the physical signs of a pulmonary affection. A rapid pulse is an almost constant concomitant of these attacks. Dr. Ringer observed a frequency of 186; but in those coming under my own observation, or recorded by others, it has rarely exceeded 140.

The possibility of this termination, however, must teach us to watch the thermometer very closely in all cases of acute rheumatism; and this duty becomes the more imperative since it is now shown that we have not merely to study a pathological fatal termination, but that the alternative of the death or possible recovery of the patient may depend on the care of the medical attendant in this respect. It is not merely the apparently severe cases at the outset that are liable to this termination. Out of 15 cases where the data have been accurately recorded by others or by myself, in 4 the temperature, prior to the extreme rise taking place, did not exceed 104°, in 2 it was below 103°, and in 2 below 102°; in 3 only had it exceeded 105°. In one case, indeed, of Dr. Ringer's, the patient, who had recovered from rheumatic fever, was about to leave the hospital next day, and died within two hours with a temperature of 110°, after being apparently in fair health. It is known that pericarditis, as such, has little influence in determining this condition; and in 7 cases, including one of my own, the heart has been found almost unaffected. Indeed, many of these cases are singularly free from anatomical changes in the viscera. The almost entire freedom from changes in the brain or its membranes, in all the post-mortem examinations made of these cases, entirely disposes of the theory of metastasis; and though they have been termed instances of 'cerebral rheumatism,' the name thus given scarcely defines their real nature.

¹ It was not noticed in the two cases I have here recorded until after the treatment by cold.

² See Case IV.

In one case only have ecchymoses been found in the meninges ; but this appearance is common in the other viscera.

I think it desirable, also, to point out that no therapeutic measure, with the exception of the employment of cold, has hitherto proved to be of the slightest effect in checking the rise of temperature. One of Dr. Ringer's cases was bled to twelve ounces, one of mine to more than twenty ounces, without effect. In fact, although bleeding possesses a certain limited power in the reduction of temperature,¹ its employment in these cases must, for the future, be regarded as entirely inadmissible. It is known to be so in the analogous condition of sunstroke², or, more properly termed, 'heatstroke,' or 'heat fever,' which is now shown to be of an analogous nature, and to be attended with hyperpyrexia, and where the most successful treatment is the cold affusion.³ In Dr. Meding's case the rise occurred while the patient was taking full doses of digitalis ; in one of mine, while the tincture of veratrum viride was being given in doses of five minims four times daily.⁴ (This patient had taken ten minim doses before, but it was omitted for twenty-four hours owing to a reduction of the frequency of the pulse to 54, associated with diarrhœa and with great depression, but with scarcely any perceptible lowering of the temperature. He had again resumed it for forty-eight hours before the final rise.) Blisters to the nape of the neck, cold to the head, sinapisms to the legs, free purgation, were all tried by Mr. Anderson without success, though his treatment was complicated by an attempt to restore perspiration by external warmth. Quinine, in the excessive doses in which I gave it (120 grains in six hours), equally failed in the first case, and also in the second, where half a drachm was given. Morphia had been given in a hypodermic injection of one-third of a grain to my last fatal case on the night of his death ; and full doses of opium in another case

¹ See Von Baernsprung, *Müller's Archiv*, 1851.

² See Dr. Bäumler, *Trans. Clin. Soc.* ; Dr. Levick, *loc. cit.*, and Dr. Gee's *Gulstonian Lectures on Pyrexia* (*Brit. Med. Jour.* vol. i. 1870) for other authorities and another case.

³ Dr. Maclean, *Reynolds's System of Medicine*, vol. ii. Dr. Levick, *loc. cit.*, reports a case where a patient suffering from heatstroke was recovered by means of the application of ice to the surface of the body after the temperature had reached 109°. I have only met with this report while drawing up the present paper.

⁴ See Case IV. Appendix.

which has come under my observation. Calomel and opium, given during forty-eight hours to the same patient three days before, had also failed to produce any impression on the pyrexia. I gave the quinine in these two instances entirely experimentally, being influenced by my observations of its apparently favourable effects in some cases of pyrexia¹ and in one of rheumatic fever.

The fact remains, therefore, that at present the only agent on which reliance can, under these circumstances, be placed, is the external application of cold; and the results of my experience may not be without their value to others. In the first place, it is very distinct from the reports of these cases that the surest, most speedy, and effectual method in which it can be applied is by immersion in the bath, while the temperature is observed in the rectum. The patients were simply lifted on a sheet into and out of the bath. After their removal from it they were wrapped in blankets. It is more comfortable to the patients to be immersed in tepid water subsequently cooled than in cold water. With this precaution the bath is to them the pleasantest of these methods of treatment. Caley repeatedly asked for it while being packed in the wet sheets wrung out of iced water. On several occasions in his case a rise of temperature was observed to follow immediately after his immersion, and also in the second bath given to Mrs. Brophy, where a rise of half a degree took place in the first five minutes, but was followed by an immediate fall. I felt doubtful whether in Caley's case this effect could be attributed to a natural tendency to rise already existing; but I am inclined to think that it was probably due directly to the bath, since it took place with a rapidity out of proportion to the previous rise, and lasted for some time. It may, indeed, be probably regarded as an exaggeration of the natural tendency produced by the first application of cold to the body, which has now been shown to be almost immediately followed by this phenomenon; and it has been observed by Liebermeister in other forms of pyrexia.² The amount of the rise and its duration was longer in the later

¹ See also the Report of the Committee of the Clinical Society, *Trans. Clin. Soc.* vol. iii.

² See Dr. Gee's Lectures, *loc. cit.*

baths, when the patient was weaker, than in the earlier ones. Thus in the first bath it only occurred during the first five minutes, and did not exceed three-tenths of a degree; but on the third, fourth, and sixth days, dating from the commencement of the treatment, the rise lasted during twenty-three, twenty-two, and twenty minutes, and amounted on these occasions respectively to seven-tenths, eight-tenths, and six-tenths of a degree. Even with this effect the amount of the rise cannot be regarded as a serious one, and it was speedily followed by a reduction of temperature. It is, however, to be observed that this rise did not appear so markedly to follow the first applications of the ice-bag or of the wet sheet, though some indications of it were occasionally observed.

The extent of the reduction of temperature by the bath demands, I believe, some precaution on the part of the practitioner. I need not repeat the details already given; but it will be observed that in both the baths given to Mrs. Brophy the temperature fell considerably—from 103° to 97.4° —after her removal from the bath. The same effect was also observed in every bath given to Caley, with one exception, occurring on the fourth day of treatment, when the bath failed to reduce the temperature to the normal standard—at least no material fall ensued after his removal from it, though this effect was observed on the intervening days. I have analysed the effects of the baths on the reduction of the temperature to a standard per minute, in order to see whether any certain data may exist to serve as a guide for their continuance; but, as will be observed from the annexed table, the rate of reduction is shown to vary in each instance in which they were employed; and the time during which the patient may be detained in them can, I think, only be determined by the effect of each individually.¹

It may be noticed in Caley's case that, with the progress of time, the pyrexia appeared more persistent, and was less influenced by cold. In Mrs. Brophy's case the application of the ice-bag was alone sufficient to maintain the temperature at a very moderate elevation after the first twelve hours, and after her second bath. In Caley's case the ice-bag also at first produced a similar effect, but gradually appeared to lose all power

¹ See table, p. 67, Appendix.

in this direction ; but, under these circumstances, the ice-cold pack continued to answer this purpose, though it required very prolonged applications of twelve and fourteen hours' duration, changing the pack repeatedly during the later days of the treatment. A similar gradually increasing resistance to the effects of the cold was observed in the fatal case before recorded.¹

Cases evidently differ largely in the intensity of the pyrexia in this respect. In Dr. Meding's case—a female, aged twenty-two—the application of ice-cold cloths to the body, together with enemata of iced water given every half-hour, reduced the temperature in five hours from 108·6° to 99·5°, and the pulse from 140 to 72 ; and no further rise ensued. The patient then perspired freely, was able to sit up within two days, and recovered without any relapse.

As a general rule, it would appear that when the rise of temperature is rapid, and it has already reached a high standard, the use of the cold bath is the most certain and speedy means for its reduction, but that it requires care for its employment—that when these indications are less strongly marked, the ice-bag to the spine may be employed—but that when the pyrexia is persistent, the sustained use of the cold pack may suffice to maintain it at a moderate standard. In the absence of appliances for complete immersion in cold water, Dr. Meding's method of employing cold enemata, frequently repeated, may also prove of value. I believe, however, that the bath may be altogether dispensed with, and that for the future it will be sufficient to place a mackintosh sheet under the patients, so arranged that the water may escape into a receptacle, and to pour cold water over them from time to time.

It became a very difficult question to decide, in Caley's case, when it was safe or desirable to discontinue the artificial reduction of temperature. In fact, I felt that it required almost more courage to abstain from this treatment, while so much pyrexia persisted, than to commence it. Feeling that any material rise of temperature must greatly reduce the patient's strength, it was my object to maintain the pyrexia at as low a standard as possible. The prostration induced by the high fever is evidence sufficient how soon the strength might be

¹ See Case III. Appendix.

exhausted by a repetition of such attacks; and Caley's case certainly appeared to threaten this by the rapid rises of temperature which were more than once repeated when the cold applications were discontinued.

It may probably require further experience to determine at what period of cases, where pyrexia still remains, it is safe to omit the cold applications. Perhaps the reappearance of perspiration may hereafter prove to be a sufficiently favourable indication in this respect. In Caley's case, however, the temperature rose to 105° after this had occurred on the third day of treatment, but it ceased to manifest this tendency in a marked degree after free perspiration occurred on the seventh day. Dr. Meding's patient perspired freely as soon as the temperature had fallen. If the perspiration is free, and the rheumatic affection reappears in the joints, these are, I think, still more favourable signs; for in their absence—whether or not we regard the poison as localised by the joint affection—its violent effects on the system are certainly more apparent than in their presence. In Mrs. Brophy's case the return of the joint affection was very slight; in that reported by Dr. Meding it did not occur at all; but in Caley's case it became very distinct coincidently with the improvement of the patient. The mode of appearance of the perspiration in these cases is also remarkable, and deserves attention. We usually consider that perspiration is a process by which the temperature of the body is partially equalised, and its spontaneous cessation in rheumatic fever is commonly associated with a rise of temperature, though it may be observed when this is comparatively high, as 104.5° or 105° . In most febrile affections, however, perspiration occurs most freely when a natural fall of the temperature is taking place, either in the periods of remission of continued fevers, or in the commencement and during the progress of the remissions of ague, or, as is still more strikingly seen in acute pneumonia, in the first period of apyrexia, following the crisis. The peculiarity, however, of these cases is the sweating that takes place when the skin is artificially cooled. It generally appeared during the first period of the rise ensuing after the cooling by means of the bath or other applications had reached the lowest point. Thus, in Mrs.

Brophy it was seen within the first fifteen hours of this treatment, four hours after the second bath, when the temperature was 100.7° . In Caley it first appeared forty-four hours after the first bath, and two hours after the removal of an ice-bag, when the temperature was 101.2° ; and again on a second occasion, five hours after the removal of an ice-bag, when the temperature was 103.4° ; but on a third occasion it appeared one hour after removal from a bath, when the temperature had reached its minimum (99.5°). It was, however, also seen on the face while the patient was enveloped in an ice-cold pack, and the temperature in the mouth was 101.6° , though it was more abundant after the pack was discontinued. In Dr. Meding's case it was observed after the first fall of temperature, and when this had reached 99.5° .

It is evident, however, that the treatment by the cold bath must not be looked upon as a curative agent for rheumatic fever *as such*, but only as a means of averting one of its accidents. In both Mrs. Brophy's and Caley's cases the rheumatic joint affection returned simultaneously with sweating and continued pyrexia. In Caley's case this was of some severity; in Mrs. Brophy's it was very slight; in Dr. Meding's patient it was, however, not observed at all. It is, indeed, possible that the rheumatic poison may in some cases be finally metamorphosed or exhausted through the intensity of the pyrexia and the rapid destruction of tissue. In Dr. Meding's case the hyperpyrexial attack appears to have occurred about the ninth or tenth day of the disease, when the termination of acute rheumatism in perfect recovery is comparatively rare; but in Mrs. Brophy the joint affection returned after twenty-six hours, and in Caley on the ninth day; in Caley also it only ceased on the twenty-eighth day after this treatment was begun, or on the forty-fifth day of the disease.

I believe that these cases afford a pretty clear proof that, with the precaution before alluded to respecting the rapid effect of the bath in the reduction of temperature, this treatment involves no specially dangerous consequences. It is true that Mrs. Brophy had an attack of bronchitis, passing, indeed, into broncho-pneumonia, on the fourth day subsequent to the first bath, and some may be inclined to think that this was a

direct consequence of the external application of the cold. I am, however, disposed to regard their connection as extremely doubtful, and to believe that this attack was one of the accidental phenomena incident to the disease itself, and not caused by the treatment. Intense pyrexia largely predisposes to congestion of the lungs, and pneumonia or broncho-pneumonia is a common complication of nearly all the acute febrile diseases, as was, indeed, noticed by Laennec, and it is by no means rare in acute rheumatism. The invasion, also, of generally disseminated moist râles throughout the lungs shortly before death, similar in character to those which appeared in Mrs. Brophy's case, has also been observed in one of the fatal cases of this nature.¹ However caused, they disappeared almost entirely while the treatment by cold applications was still continued—a fact which is of considerable importance in estimating its safety. The cardiac complication, also, which in Mrs. Brophy's case was comparatively slight, was in her not only not aggravated, but positively improved, during the same period.

Still more striking in this respect is the evidence afforded by Caley's case, how little the most serious complications can interfere with the general utility of the treatment. He had a double pleuro-pneumonia² and a pericardial effusion, producing dulness as high as the second left cartilage, before he was put into the bath. The pneumonia resolved, and the pleuritic effusion almost disappeared, during the period that the treatment by cold was continued. We have learnt from F. Weber's, Bartel's, Niemeyer's, and Ziemssen's observations, that the treatment by cold applications is distinctly beneficial in many cases of pneumonia; and the existence of this complication need not, therefore, be any bar to the practice. There was certainly, in Caley's case, an increase in the pericardial effusion, which at one time reached an alarming amount during the early days of the treatment; but it also again diminished while this was still persisted in. I cannot feel that this increase of the effusion can be justly attributed to the treatment by cold. It is too common a complication of the disease to be,

¹ See tables of cases No. vi. by Dr. Murchison.

² The signs of pneumonia existed before those of pleuritic effusion.

I think, regarded in any other light than as a part of its natural tendency and course. Besides, whatever speculations may be indulged on this point, when we look at the alternative between resorting to and withholding this treatment, under the circumstances then existing, I feel that no complications of this nature should stand in the way of its immediate employment. The slight rigors occasionally observed during the falls of temperature do not appear to have been followed by any injurious effects. It may be noted that in one of these, in Caley, and in another in Mrs. Brophy, the temperature was still above the normal standard.

It may perhaps be questioned whether, in future cases, any external warmth may be necessary to prevent too great a fall of temperature. Even severe collapse produced by cold has been shown by F. Weber's, Bartel's, and Ziemssen's observations on the pneumonia of children, to be less dangerous than it at first appears.

To some it may appear that the cold sheet has this advantage over the bath, that, its application being continuous, there is less fear of 'reaction.' I very much doubt, however, whether the rise of temperature following either of these can be regarded in any material sense in this light, and I think that it must be looked upon as one of the natural phenomena of the disease. If there is such a 'reaction,' it is certainly long delayed, as is evidenced by the prolonged fall of temperature which ensued after the removal from the bath.

The importance of avoiding the *nimiam medicince diligentiam* has induced me to consider carefully the subsequent treatment of these cases. I allude particularly to the administration of quinine and of stimulants. Dr. Meding's patient, as far at least as is reported, seems to have recovered without any further assistance; therefore it may be a question whether the remedies given in the latter stages of both these cases were not unnecessary. This can only be tested by actual experiment; but I believe that both the patients whose cases I have recorded were benefited by the stimulants administered, and I very much doubt whether Caley would have recovered at all without them. For twenty-four hours on the fifth day of this treatment I was hourly expecting his death from exhaustion while the pericar-

dial effusion was at its height, and I more than once considered the propriety of resorting to paracentesis pericardii, which has been so successfully practised by Dr. Clifford Allbutt of Leeds.¹

We have long learnt that the administration of stimulants does not increase pyrexia in the acute febrile diseases; and though I by no means think their indiscriminate use desirable, there are circumstances when the largest doses that can be taken may be administered with advantage, and I believe that Caley's case was one of these. The indications for their use in Mrs. Brophy's case were also very distinct. However, Dr. Meding's case is a valuable contribution to the history of this treatment, inasmuch as the patient recovered rapidly without stimulants, thus showing that they are not invariably necessary.

The value of quinine is, perhaps, more doubtful; I do not allude to the first large doses which I gave tentatively, in order to test its power of checking the rapid rise of temperature. This, as has been seen, failed entirely. My reasons for continuing its use were chiefly four. In the first place, Briquet² showed that the administration of full doses of this drug in rheumatic fever—75 grs. to 90 grs. in the twenty-four hours—had the effect of retarding the frequency of the pulse. In the second, as I have already stated, I had seen the temperature fall under its use in this disease, and also in other febrile affections; and I thought it possible that, after the intenser paroxysm had been subdued, its effects in this direction might still become apparent. Thirdly, the committee of the Clinical Society, in their report on this subject, have adduced much evidence of its power in this direction in other febrile diseases. Lastly, it has been freely used in Germany in conjunction with the cold bath in the treatment of typhoid fever. I had also thought it possible that the retardation of the pulse, after the first fall of temperature, both in Mrs. Brophy's and Caley's cases, might be in some degree due to the large quantities before taken; and I desired, if possible, to maintain this effect. Dr. Meding's case, however, shows that the restoration of the pulse to a nearly normal frequency may occur under the use of

¹ *British Medical Journal*, 1870, ii. 31.

² *Traité Thérapeutique du Quinquina*, p. 30.

cold alone, without the employment of quinine; and I question whether in mine, when the same effect was observed after the baths,¹ any direct effect could be attributed to the quinine. The large dose at first given to Mrs. Brophy produced some gastric disturbance; and I think that a minor degree of this complication is to be attributed to its employment in Caley's case. It would therefore appear desirable that future cases should be treated without it, until at least it is seen whether any more distinct indications call for its employment.

In Caley's case the quantity of urine and urea passed during the febrile stage was very large, but both were higher in the later than in the earlier periods of the treatment. Forty-eight hours after the treatment was commenced he passed 109 ounces of urine, containing 527 grains of urea; on the fifth day 191 ounces, containing 767 grains; on the twelfth day 165 ounces, with 894 grains; though on the eighth day 64 ounces of urine only contained 220 grains, and on several days the amount of urea was less than 500 grains.

The quantitative analysis of Mrs. Brophy's urine was only commenced on the fifth day after the extreme pyrexia. Subsequent to this day the greatest quantity of urea passed was 433 grains, and it never but once exceeded 350 grains. It is probable therefore that the products of the decomposition of tissue were eliminated in the first four days, during which the patient was, however, still pyrexial.²

I may, in conclusion, be permitted to remark that I trust that this treatment may be hereafter found equally successful in other febrile diseases presenting similar phenomena of hyperpyrexia, and in some cases of pyæmia, scarlatina, puerperal fever, and even of tetanus. It is a possible accident in the whole class of these affections, and it is probable that many of those whose duration is definite will present a more favourable field for its utility than acute rheumatism, which may, as in Caley's case, be indefinitely protracted, even after the immediate danger of death has been averted; but in the specific fevers, if life can only be protracted and the strength maintained through their natural course, they tend finally to a spontaneous recovery.

¹ See Diagrams II. and III.

² See tables of analysis of the urine, Appendix.

I must, finally, express my sincere thanks to my assistant, Mr. Bindley, and to my clinical clerks, Mr. Greenfield and Mr. Benham, and to the sister Superior and nurses of the wards, for the admirable and intelligent aid which they afforded me during these observations. A large proportion of the records of the temperature, and many notes of the state of the patients, are due to them. The temperature was taken in both cases every half-hour during the day and night, and the accuracy of the observations carefully verified. To Mr. Benham I am indebted for the quantitative analyses of the urine during many days consecutively.

Although two cases of this nature, occurring simultaneously, were a great strain upon the nurses of the ward, I am yet disposed to believe that, with the aid of one or two intelligent attendants, and watchfulness on the part of the medical practitioner, no less success may attend this treatment even in private practice. Though Caley's case was of great severity, yet that recorded by Dr. Meding, which occurred in a servant in a private family, is a proof how speedily recovery may ensue under these hitherto fatal circumstances of the disease.

I believe that when cases of acute rheumatism are more carefully watched with the thermometer than they have hitherto been, a large proportion of the instances in which it is immediately fatal will be found to be of the class now considered. I have only seen a very few cases where, without an extreme pyrexia, death could be attributed solely to complications existing in the heart and lungs; and I believe that several of the cases proving rapidly fatal which I have seen in the course of my hospital experience have been due solely to this cause, though the temperature has not been in all cases accurately recorded. If the treatment here proposed is as successful in the hands of others as it has proved in mine, I think we may indulge the not altogether vain expectation that the mortality of this disease may be materially diminished, at least in one of its most dangerous forms.

be confidently anticipated; but, as I have before stated, the amount of the probable subsequent reduction must be judged of by the rapidity of the fall in each bath, as the effect appears to be by no means uniform.

This patient presented a complication in the cessation of menstruation, the effect of which, either in the direct causation of the hyperpyrexial attack, or on its subsequent progress, it is not easy to estimate. Among the recorded cases, it is the only instance of this complication, and therefore it can only be looked upon as a possible cause of the nervous symptoms.

Diarrhoea and meteorism, which were present in this case, were not observed in either of the others; for though Caley passed one loose motion during the earlier periods of this series of phenomena, the subsequent evacuations were formed and apparently healthy.

CASE III.¹ E. H—, aged thirty, a well-built, strong, healthy, active, well-nourished female, a housemaid in a gentleman's family, with no hereditary predisposition to disease, and whose health had previously been perfectly good, suffered, about three weeks before the attack of rheumatic fever, from some pain in the wrist, which was attributed to a strain, and which passed off in about a week under the application of wet bandages. On Sunday, May 23rd, 1869, she complained of pain and swelling in the left ankle; there was very slight pyrexia; temperature $99\frac{1}{2}^{\circ}$. She was kept in bed; took a dose of calomel and Dover's powder, which was followed throughout the week by a mixture composed of a scruple of bicarbonate of potash and a drachm of acetate of ammonia solution, taken every fourth hour; and the joint was wrapped in cotton-wool. The joint affection and pyrexia during the following days were very slight, the temperature never being found to exceed $99\frac{1}{2}^{\circ}$. On the 30th the opposite ankle and the right hip were, however, attacked, and the temperature was found to be 100° . She was then removed to University College Hospital. The temperature on May 30th and 31st and June 1st did not exceed $101\cdot4^{\circ}$, but on the evening of June 2nd, it rose to $102\cdot2^{\circ}$. On the 2nd the wrists were attacked, the affection of the ankles having partially subsided. Some

¹ From *Lancet*, July 8, 1870, vol. ii.

indications of pericardial effusion were then also discovered, in indistinctness of the apex beat and slight elevation of the cardiac dulness. These were found on the 3rd to be more evident. The apex beat was in the fourth interspace; the dulness had extended to the second costal cartilage, and friction-sound of grazing character was heard at the base. It was subsequently ascertained that menstruation had appeared on the night of June 1st, and ceased abruptly on the night of the 2nd, without any discoverable cause. During June 3rd the temperature continued to rise throughout the whole day, without any fresh joint affection, but with a gradually increasing degree of restlessness. Sweating, which had been slight through the whole disease, continued throughout the early part of this day. The subsequent condition of the patient in this respect was not noted.

The rise of the temperature was, however, sudden and abrupt in the later hours of the evening of this day.

At 10 A.M. it was 102° in the axilla; pulse 112; resp. 28.

At 8.30 P.M. „ 104.8° „

At 11.30 P.M. „ 106° „

At 12 „ 107.8° „

During the evening delirium had commenced, and at 11.30 I was summoned, and found the patient with a hot skin, and violently delirious, requiring at times two people to restrain her in bed, uttering loud cries and talking incessantly. The state of the heart was unchanged. The exact frequency of the pulse was not recorded. I determined to try the effect of a full bleeding. This was practised at 12.25 A.M. on the morning of June 4th, to the extent of between twenty and thirty ounces. The blood was unfortunately thrown away without examination. The immediate effect of the bleeding on the delirium was remarkable. It ceased abruptly, and the patient was quiet for a short time, but passed into a state of perfect unconsciousness. Then succeeded a peculiar series of irregular muscular movements of the hands and arms, with chattering and grinding of the teeth, and convulsive movements of jaws, which continued for some time, during which, however, no further elevation of the temperature ensued.

At 1 A.M. on the 4th, or within half an hour after

bleeding, it had reached 109° ; at 1.10 A.M. it was 108.9° . She was then wrapped in a wet sheet, and retained there fifteen minutes, and subsequently was lifted on the sheet and dipped in a cold bath (temperature 60°) for five minutes. After this the temperature was 108.4° , which was maintained for fifteen minutes. She was then immersed for fifteen minutes in the cold bath, temperature 60° . The temperature in the axilla, after removal from the bath, at 2.25 A.M., was 104° ; in the rectum, 107.1° . At 2.34 A.M., or nine minutes later, the latter was found to be 106.4° ; and at 2.45 A.M., or twenty minutes later, it was 105.4° , reaching, at 3.15 A.M., 104° . At 3 A.M. there was an attack of clonic spasms of the muscles of the arms, lasting some minutes; but the temperature continued to fall until 4.20 A.M., when it reached 102.8° in the axilla, having been noted at 3.50 A.M. as 103.7° in the rectum. At 5 it had again risen to 104.8° in the rectum, and continued to rise steadily until 7 A.M., when it had attained to 106.3° . At this time she was placed in a bath of the temperature of 80° , and retained there for five minutes. At 7.20 the temperature in the rectum was 105.1° , and by 8.45 it had fallen to 104.2° . It then again began to rise, and at 10.35 it had reached 105.6° , when the patient was again placed during six minutes in a bath at 80° . Nine minutes after her removal from the bath the temperature had fallen in the rectum to 105.1° , but it rose again within twenty minutes to 105.6° , and maintained this height for an hour, when it had again risen to 105.8° ; and in two hours (12.45) after the removal from the bath had reached 106.4° . She was again kept for eighteen minutes in a bath at 80° , during her stay in which signs of syncope appeared. Seven minutes after removal from the bath, the rectal temperature was 105.8° , and it fell during the succeeding hour to 104.8° . It then again began to rise, and within another hour and a half (3.45 P.M.) the thermometer stood at 106.4° . She was then kept for twenty minutes in a bath at 78° . Five minutes after her removal from this the temperature of the rectum was 104.8° , and continued to fall for another hour and twenty minutes (5.30 P.M.) to 103.6° . It then again rose, and in three hours (at 8.30 P.M.) it had again reached 106.5° . She was placed in a bath at 78° Fahr., and kept there for 45 minutes. During the time that she was in

the bath the temperature fell gradually to 103.2° , and continued to fall for seventy minutes after her removal, until it had reached 101.8° . The succeeding rise occupied a much longer period than those preceding, the temperature of 106.1° being only attained after four hours, or at 2.45 A.M., and the subsequent effect of this bath was thus to keep the temperature for four hours below 104° , including the time occupied by the fall below this temperature and the subsequent rise until it was again attained. At 2.45 she was again placed in a bath of 80° for ten minutes, the continuous sinking during so long a period which had followed the more prolonged action of the bath having impressed me with the necessity of caution in the then exhausted state of the patient. The effect of the shorter stay in the bath was less marked. The temperature fell during one hour to 104.4° , and then rose gradually during two hours and twenty-five minutes, when at 5.10 A.M. it had again reached 106.2° . A subsequent immersion during forty minutes again lowered the temperature to 102° in the axilla and 103.4° in the rectum, and it never again rose above 105° . The exhaustion of the patient was now extreme; but as the thermometer still showed, after two hours, a tendency to rise, the patient was placed in a bath at 92° , to be raised to a temperature a little below the normal standard of a healthy person, in which she was kept for an hour and a quarter. The effect of this on the temperature was that it fell to 104.4° , and maintained this uniform standard during an hour without either subsequent elevation or depression. The patient continued to sink, however, and as death was evidently approaching, she was removed from the bath at 12.15, and died at 12.20, or nearly thirty-six hours after the treatment was commenced.

It requires to be mentioned that colliquative diarrhœa of intensely fetid character, and attended by meteorism of the abdomen, commenced soon after the bleeding, and continued uninterrupted throughout the whole of the rest of her life. Both the stools and the urine were passed unconsciously, but the patient was able to swallow, and brandy, beef tea, and quinine mixture were given at frequent intervals. A few doses of tincture of opium, three minims, with compound spirit of lavender, two drachms, were also given.

A post-mortem examination was, unfortunately, not attain-

able; but, during the last day of life, Dr. Squarey called my attention to the fact that percussion over the region of the heart had become normal, and this I confirmed.

The following table exhibits the continuous series of temperatures observed and the effects of the treatment. I desire to express my obligations to Dr. Squarey, the then resident medical officer of the hospital, who, with my assistant, Mr. Dessé, most ably assisted my observations, and to whom many of the records of the temperature, particularly those made on the second night of the treatment, are due:—

Date	Hour	Temperature ¹		Pulse	Resp.	Remarks
May 30.	9.45 p.m.	100.4	...	100	22	
May 31.	11.45 a.m.	100.	...	96	28	
	9.45 p.m.	101.4				
June 1.	10.0 a.m.	101.4	...	104	32	
	9.0 p.m.	101.4	...	...	...	Menses appeared
June 2.	10.0 a.m.	101.4	...	104	32	June 1, and ceased
	9.0 p.m.	102.2				during night of
June 3.	10.0 a.m.	102.	...	112	28	June 2.
	8.30 p.m.	104.8				
	11.30 "	106.				
	12.0 "	107.8	...	...	...	Violent delirium.
June 4.	12.25 a.m.	...	...	...	...	Bled to more than 20 oz.
	1.0 "	109.	Ax.	...	...	Trismus and spasm.
	1.10 "	108.9	Ax.			At 1.25 a.m. was
	1.40 "	108.4	Ax.			wrapped in wet
	2.20 "	104.	Ax.			sheets for 15 min.
	2.25 "	107.1	Rec.			2.20, cold bath 15 min.; temp. 60°.
	2.34 "	106.4	Rec.	...	...	Removed from bath.
	2.45 "	105.4	Rec.			
	3.15 "	104.	Rec.	...	...	3 a.m., clonic spasm
	3.50 "	103.7	Rec.			of arms.
	4.20 "	102.8	Ax.			
	5.0 "	{ 104.8	Rec.			
		{ 104.6	Ax.			
	5.35 "	105.	Ax.	132		
	6.0 "	105.	Ax.	128		
	6.30 "	105.5				
	7.0 "	106.3				
	7.7 "	...	...	...	...	Bath 80°; 5 min.
	7.20 "	105.1	Rec.	128		
	7.55 "	104.2	...	132		
	8.45 "	104.2	Ax.	132		
	9.15 "	104.4	...	132		
	10.10 "	105.6	...	120		
	10.35 "	106.6				

¹ The temperature was taken in the rectum where indicated by Rec. The site of some of the observations is not noted; some, indicated by Ax., were taken in the axilla.

Date	Hour	Temperature		Pulse	Resp.	Remarks
June 4--cont.	10.40 "	...	...	...	...	Bath 6 min.; temperature 80°.
	10.46 "	...	...	...	...
	10.55 "	105.1	Rec.	...	...	Pulse very weak; peculiar puffing respiration; diarrhoea.
	11.15 "	105.6	Rec.	...	...
	11.45 "	105.6	Rec.	...	...
	12.10 p.m.	...	...	144	...	Draught, 10 minims of tincture of opium with comp. sp. of lavender. Meteorism.
	12.15 "	105.8	Rec.	...	...
	12.45 "	106.4	...	...	...	Bath 11 min.; temp. 80°. Signs of syncope; diarrhoea present.
	1.5 "	105.8	Rec.	...	...
	1.40 "	104.9	Rec.	...	...
	2.15 "	104.8	Rec.	...	...
	2.45 "	105.2	Rec.	...	...
	3.15 "	105.9	...	...	...
	3.45 "	106.4	...	...	...
	3.55 "	...	...	...	...	Bath 20 min.; temperature 78°.
	4.20 "	104.8	Rec.	...	...
	4.50 "	103.5	Rec.	136	...	
	5.30 "	103.6	Rec.	...	...
	6.20 "	104.1	...	132	...	
	6.50 "	104.8	...	...	...
	7.20 "	105.2	...	...	...
	7.50 "	106.2	...	...	...
	8.20 "	106.5	...	...	...	Bath 45 min.; temperature 80°.
	8.37 "	106.8 ¹	...	...	...
	8.45 "	105.4 ¹	...	...	...
	9.0 "	103.8 ¹	...	...	...
	9.5 "	103.2 ¹	...	...	...	Removed from bath.
	9.20 "	102.6	Rec.	...	...
	10.0 "	101.6	Rec.	...	...
	10.30 "	101.8	Rec.	...	...
	11.15 "	102.1	Rec.	124	...	
	11.45 "	102.6	Rec.	...	...
June 5.	12.15 a.m.	103.2	Rec.	...	...
	1.0 "	104.	Rec.	...	...
	1.30 "	104.6	Rec.	...	...
	2.15 "	105.9	Rec.	...	...
	2.45 "	106.1	Rec.	...	...	Bath 10 min.; temperature 86°.
	3.6 "	105.8	Rec.	144	...	
	3.45 "	104.4	Rec.	144	...	
	4.15 "	105.	Rec.	144	...	
	4.45 "	105.6	Rec.	144	...	
	5.10 "	106.2	Rec.	...	...
	5.13 "	...	...	...	...	Bath 12 minutes.
	5.35 "	105.6	Rec.	140	...	
	6.15 "	104.2	Rec.	138	...	
	6.45 "	104.8	Rec.	144	46	
	7.15 "	105.3	Rec.	...	...
	8.10 "	106.8	Rec.	...	...	Bath 30 minutes.
	8.30 "	106.4 ²	...	...	...
	8.40 "	105.4 ²	...	...	...	Removed from bath.
	8.50 "	104.8	Rec.	...	...
	9.20 "	102.	Ax.	...	...
	9.30 "	103.4	Ax.?	...	...

¹ Rectum and while in bath.² In bath.

Date	Hour	Temperature		Pulse	Resp.	Remarks
June 5— <i>cont.</i>	9.55 "	103.6	Ax. ?			
	10.5 "	104.	Ax. ?			
	10.40 "	104.8	Ax. ?			
	10.55 "	...	...	...	...	Put into bath, and retained there until 12.15. Temperature of bath 92°.
	11.0 "	105.1	...	...	...	Bath 95°.
	11.10 "	104.2 ¹	...	132	...	Bath 98°.
	11.20 "	104.4 ¹	...	132	...	Bath 97°.
	11.30 "	104.4 ¹	...	132	...	Bath 96°.
	11.40 "	104.2 ¹	...	136	...	Bath 94°.
	11.50 "	104.6 ¹	...	132	...	Bath 92°.
	12.0 "	104.4 ¹	...	130	...	Bath 92°.
	12.20 p.m.	...	...	...	...	Death 5 minutes after removal from bath, room 67°.
	1.25 "	99.4 ¹				

¹ In bath.

I append also the notes of another fatal case illustrating the rapid rise of temperature at the close. It will be observed that the pain in the joints disappeared at a comparatively early stage, but delirium and sleeplessness became from this time prominent symptoms, though the latter was to some degree combated by hypodermic injections. The solution of morphia used was a concentrated one, containing about a grain in m v. It will be observed that the final rise of temperature took place while the patient was under treatment by *veratrum viride*.

At the post-mortem examination there was found to be more affection of the endo-cardium than has been observed in some other cases of this nature; but the brain was, comparatively speaking, almost healthy. The post-mortem fluidity of the blood observed here appears to be an almost constant appearance in these cases.

CASE IV.—James Barnes, æt. 35. Admitted to University College Hospital June 29, 1870.

History: Occupation, porter at Camden Town goods station for the past nine months; for twelve years before this was a marine artilleryman. Previous health always good. Mother died of phthisis; no other hereditary predisposition.

The present illness—his first attack of rheumatic fever—began on June 20th by pain and swelling in all the joints of the legs and feet.

On the following day the pain left the legs and attacked the arms.

On admission was ordered—Calomel gr. ij. h. s. s^d.

Mist. salin. aper. ℥j. post hor. 4.

R. tr. ferri perchlor. ℥ xxx.

Æther. chlor. ℥ xx.

Glycerine q. s.

Aquæ ℥ iss. every three hours.

Cotton wool to heart and painful joints.

June 30th, tenth day.—Slight anæmia of lips and conjunctivæ; skin hot, but perspiring profusely, with peculiar acrid odour. Tongue covered with dense white fur, especially in posterior part. Pulse 96, full and bounding; appetite almost nil; thirst excessive. Complains of tenderness and pain on movement of all the joints of his hands and arms, which are swollen. The legs are free. Heart: apex $\frac{3}{4}$ inch below level of nipple and one inch inside. Impulse normal; area of cardiac dulness not enlarged. Sounds normal, except a slight roughness at apex, with systole.

July 1st, eleventh day.—Last night took chloral gr. xxx. About an hour afterwards he woke up from sleep and was delirious. Did not complain of headache; there was no photophobia. The temperature was 102°, and remained so throughout the night. At 2 A.M. took pulv. ipecac. co. gr. xij., and had after it some broken sleep. Heart: no increase of dulness; slight blowing murmur at apex.

July 4th, fourteenth day.—Altogether free from pain; only complains of weakness and thirst: can move his limbs without pain. Skin sweating; upper part of chest covered with miliaria rubra and sudamina. Tongue moist, with slight fur, dark brown or black, from iron. No headache; no delirium. Slept well last night after ℥ iss. of sol. morphinæ hypodermically injected. No cough whatever. Heart: apex beat in normal situation; impulse regular; no increase of superficial dulness; at apex no murmur nor roughness; at base no alteration.

July 5th, 15th day.—Has not slept well. Urine, light, cloudy, flocculent deposit; pale neutral, no albumen.

July 6th, 16th day.—Says he has not slept for more than four hours altogether for a fortnight, but nurse reports that he slept five hours during yesterday; took last night liq. morph.

℥ xx.; this caused excitement, but no sleep; about two hours later he had sol. morph. ℥ iss. hypodermically, and slept about one hour. Temperature 104.4°; no headache; no squinting, vomiting, or nausea. Feels hungry; has no pain anywhere, and can move his limbs freely without pain. Tongue moist; countenance earthy. Heart: no increased dulness; apex in normal situation; soft blowing systolic apex murmur; no friction heard. Pulse 84, full, regular. Ordered Cannabis Indicæ gr. i.; statim to be repeated in the evening.

July 7th, 17th day.—The Cannabis Indicæ failed to produce sleep, and he was given a hypodermic injection of morphia, gr. $\frac{1}{4}$. This produced three hours' sleep. Patient still very restless. Tongue dry, brown fur; earthy tint of skin. He is very thirsty; urine copious, straw-coloured, sp. gr. very low, no albumen. Complains of inability to retain his urine. Bowels open. Heart: apex normal situation. The systolic murmur is louder; no increased dulness. Pulse 88; soft, regular, weak; no cough. Pulse-respiration, ratio 1 to 2.25; there is some return of tenderness in joints; for the last two days all pain had disappeared.

July 8th, 18th day.—Potass. bromid. gr. xxx., given at 8.30 p.m., had no effect in procuring sleep, and accordingly a hypodermic injection of morphia gr. $\frac{1}{3}$ was given at 10.30 p.m. He was ordered to be sponged with tepid water; to have mist. sal. aper. 3j. This morning patient feels much better; has had a long sleep during night; tongue moister and cleaner than yesterday; skin, hot, dry; the whole body profusely covered with miliaria and sudamina. The fluid contained in the vesicles faintly acid. Joints, no pain; can move them all; no headache; pupils slightly contracted; pulse remains the same (88). Heart: apex normal situation; the systolic murmur the same. At the base a systolic murmur conducted to the second right cartilage. Urine pale; slightly cloudy, flocculent, sp. gr. 1005; reaction neutral, contains neither albumen nor sugar; quantity excessive. He can retain it now for ten or fifteen minutes.

July 9th, 19th day.—Says he does not feel so well; no pain. Complains (as he did last night for the first time) of some slight difficulty of breathing and oppression; systolic apex murmur is rougher; basic murmur doubtful; slept pretty

well nearly all night. Temperature last night 104.2° F. Iron to be discontinued. Urine copious, 123 ounces, same character. To have calomel gr. $\frac{1}{2}$, opium gr. $\frac{1}{4}$, every six hours.

July 10th, 20th day.—The bowels have been open five or six times since last evening. The last two evacuations are healthy in colour and consistence; no evidence of the effect of iron upon them. In addition to the opium contained in pills, he had $\frac{1}{2}$ gr. of morphia hypodermically; has passed a restless night. Temperature this morning 104.2° . Pulse 92; resp. 26; no cough nor oppression. Heart: murmur at apex retains the same character; apex situation normal; skin pungently hot and dry; chest and arms are covered with miliaria and sudamina—the latter have lost their transparency; there is some desquamation. To be sponged with cold water. To have the pills every eighth hour. There is no tenderness of the gums. Has been delirious to a slight extent; no pain in head; pupils very little contracted. He is still restless; urine as before, 94 ounces.

July 11th, twenty-first day.—Last night the temperature was 105.4° . Patient was delirious during the night and got out of bed. This morning pulse is weak, and he has an anxious look and very muddy complexion; temperature 104° . At 10 A.M. the calomel was now discontinued, and patient was ordered to take Tr. veratri viridis \mathfrak{m} v every two hours, and after four doses to have \mathfrak{m} x every two hours. *Evening*, 7 P.M.: patient still continues to urinate copiously. The veratrum was begun at 11 A.M., and he has had three doses of \mathfrak{m} v and two doses of \mathfrak{m} x; altogether \mathfrak{m} xxxv. At present pulse 64, being reduced by 40 beats since this morning, and the temperature is $\frac{1}{2}$ a degree lower than this morning, whereas it is usually higher at this time of the day. Respirations 20. A few minutes ago he was sick and faint. Pulse weak. Pupils widely dilated. Bowels acted three times during the day. The veratrum to be discontinued. At 12 P.M., there having been no more diarrhœa nor sickness, he was ordered to begin the veratrum again in \mathfrak{m} v doses.

July 12th, twenty-second day.—Had a pretty good night after hypodermic injection of morphia \mathfrak{m} iiss. Has lost the earthy look. Tongue decidedly cleaner; skin hot, 104.4° , and still dry. Miliaria still very copious on chest and arms, but

has disappeared from legs. Talks composedly; has no pain whatever. Heart, no murmur at base; that at apex is much less marked; no increase of dulness; apex beat normal situation; urine still copious. Treatment.—The veratrum had to be given up again at 6 o'clock A.M., there having been four more motions, the two last containing small clots of blood: ordered, at 6 A.M., brandy ℥ii Tr. opii ℥xij . *Afternoon*.—The veratrum was commenced again to be given in doses of ℥v four times a day, with morphia gr. $\frac{1}{10}$.

July 13th.—Temperature last night was $105\cdot2^{\circ}$. Pulse 100, respiration 32. Pulse bounding, regular; ordered Tr. Belladon. ℥x , Tr. Opii ℥x , aquæ ad ℥ss . Was delirious during the night, sleeping but little, and got out of bed during the night twice. Temperature $103\cdot4^{\circ}$; pulse 100; skin dry; tongue still cleaning; bowels opened three times in the night; no blood, not diarrhœic; on the whole he looks better but talks more incoherently; still going on with the veratrum four times a day.

July 14th.—Looks better this morning; slept three hours during the night after hypodermic injection of morphia gr. $\frac{1}{2}$; was delirious and restless after sleep; the tendency to delirium has increased; bowels not open during the night; pain and tenderness on movement have returned in right wrist; urine retains the same characters; temperature lower ($102\cdot7^{\circ}$). Pulse and respiration as before; no headache, no strabismus; the veratria on the 13th to be continued every four hours.

July 15th, twenty-fifth day.—Yesterday afternoon he slept four hours after a hypodermic injection (℥ij). *Evening*.—Evidently worse; pulse quick, weak; more delirium; did not recognise his friends; wandered very much; was not violent. Temperature at 9 P.M. $105\cdot4^{\circ}$; he had morphia gr. $\frac{1}{2}$ hypodermically at 10 P.M. and soon fell asleep, and slept until 1 A.M. (15th). After 1 A.M. he lay quiet some time and dozed; woke struggling; 4 A.M. temperature $106\cdot2^{\circ}$; 6 A.M. temperature $109\cdot3^{\circ}$; breathing rapid; mucus collecting in his larynx, causing rattling; motions passed involuntarily; threw his arms about wildly, with convulsions of muscles of face; at 7.45 A.M. temperature $111\cdot6^{\circ}$; at 8 A.M. death.

Post-mortem five hours after death; weather warm; body well nourished; slight rigor mortis; temperature in pericardium,

105·6°; ditto, in abdomen, 106·2°; pleural cavity contains a little clear fluid. A few ecchymoses on pericardium (parietal) near base; not a trace of exudation; about 3j of clear serosity in pericardium; pleuræ free; blood fluid. Abdominal muscles remarkably firm; some parts of the recti abd. on each side are paler than natural, partly in a state of waxy degeneration. Peritoneal cavity perfectly healthy. Heart, right auricle: endo-cardial lining healthy, perhaps a little more opaque than natural; tricuspid valve healthy; left auricle slightly opaque, more so than right; auricular surface of mitral valve shows some vegetations; the free edge is both indurated and thickened. Left ventricle firmly contracted; mitral valve, distinct granulations along whole free edge; marked hyperæmia passing into ecchymoses around granulations to such an extent as in some places to suggest ulceration; aortic valves show similar granulations and warty growths, attended with some hyperæmia; muscular tissue rather pale, softer than natural. Lungs: left crepitant throughout, *dry*, moderate degree of hyperæmia; in right lung, a little congestion at base. Kidneys firm, healthy, no marked hyperæmia; spleen decidedly enlarged, measures 8 × 4 inches and about 1½ inch in thickness, weight 11 ozs.; intense congestion, with cloudy swelling and great friability. Liver: extremely hyperæmic, chiefly hepatic; hyperæmia under capsule amounts almost to ecchymosis; no apparent change in tissue; weight, 70 ozs. Supra-renal capsules healthy. Stomach, ecchymoses in mucous membrane, otherwise healthy. Intestines show no morbid alteration. Brain, superior longitudinal sinus free; dura mater, external surface slightly hyperæmic; venous congestion of arachnoid on upper surface of hemisphere; blood more fluid than natural; more fluid in sub-arachnoid spaces than natural, membranes separate readily; convolutions slightly flattened; calvarium unusually thick and solid; not a trace of lymph or other inflammatory products in membranes of base; hyperæmia of both white and cortical substances moderate, can scarcely be said to be in excess, more apparent in some places than others; no excess of fluid in lateral ventricles; no abnormal appearance of lining membrane of ventricles; central parts of brain perfectly healthy.

The following table exhibits the temperatures observed in this case:—

BARNES.

Date	Hour	Temp.	Pulse	Resp.	Remarks
8th day, June 29	9.0 p.m.	101.8	100	28	Tr. Ferri. Perchlorid. η xxx. every 3 hours.
" 30	9.0 "	102.4	96	34	
July 1	1.0 a.m.	102.7	...	...
	4.0 "	102.7	...	...
	9.0 "	101.7	...	35	
	10.30 p.m.	102.8	...	...
" 2	10.0 a.m.	101.7	...	42	
	10.0 p.m.	103.7	...	...
" 3	9.20 "	103.7	
	9.45 a.m.	101.7	84	37	
" 4	9.30 p.m.	102.2	
	9.30 a.m.	102.5	120	40	
" 5	10.0 p.m.	102.4	80	32	
	9.15 a.m.	104.4	84	28	
" 6	12.0 noon	104.7	80	26	
	2.0 p.m.	103.5	82	32	
	4.30 "	103.4	84	32	
	9.30 "	103.4	90	...	
" 7	9.30 a.m.	103.7	88	38	
	10.0 p.m.	104.7	88	28	
" 8	9.30 a.m.	103.2	88	30	No pain in joints; sponged with tepid water.
	10.0 p.m.	104.2	86	26	
" 9	9.40 a.m.	103.3	88	34	Iron discontinued: calomel gr. $\frac{1}{2}$; opium gr. $\frac{1}{4}$ every six hours.
	10.0 p.m.	104.7	...	...
" 10	10.0 a.m.	104.3	92	26	Sponged with cold water in course of day.
	10.0 p.m.	105.4	94	28	
" 11	9.40 a.m.	104.2	102	32	Calomel discontinued. T. verat. virid. η v. at 11 a.m., 1 p.m., 3 p.m.; at 5 p.m., and 7 p.m. η x.
	10.0 p.m.	104.7	108	...	
	3.0 "	...	88	...	8 p.m., sick and faint; diar- rhoea; pupils dilated; veratrum to be discon- tinued; has taken η xxxv.
	7.0 "	103.4	64	20	
" 12	8.0 "	104.7	54	...	
	9.30 p.m.	103.4	64	20	
	2.0 a.m.	104.4	Veratrum begun again at 12.10 a.m.; after three doses, diarrhoea and bloody stools. Left off at 6 a.m.
	6.0 "	104.7	68	...	
	9.0 "	104.4	96	24	Veratrum recommenced at 3 p.m. η v. 6is horis with morphia gr. $\frac{1}{16}$.
	11.0 "	104.4	84	...	
" 13	9.0 p.m.	105.2	100	32	No more diarrhoea; still veratrum.
	10.0 a.m.	103.4	100	34	
" 14	10.0 p.m.	103.8 (?)	94	34	
	9.45 a.m.	102.7	100	32	
" 15	9.0 p.m.	105.4	112	40	
	4.30 a.m.	106.2	...	...
	6.20 "	109.2	
	7.45 "	111.7	...	...
" 16	8.0 "	Death.

TABLES OF TEMPERATURE, SHOWING THE EFFECTS OF THE TREATMENT
BY COLD.

No. I.—Mrs. BROPHY.

Date	Hour	Temp.	Pulse	Resp.		Remarks
June 5. 9th day of disease.	8.0 p.m.	102.9	88	30		
" 6.	11.0 a.m.	101.2				
	10.0 p.m.	100.7	88	28		
" 7.	10.0 a.m.	99.66	80	32		
	11.0 p.m.	100.9	92	28		
" 8.	12.0 noon	100.6				
	9.0 p.m.	100.7	88	42		
" 9.	11.0 a.m.	99.2	84	36		
	9.0 p.m.	101.2	88	30		
" 10. 14th day of disease.	9.0 a.m.	*				* Not ex. 102°.
	3.0 p.m.	105.0	...	...	Ax.	
	4.0 p.m.	106.3	...	...	Ax.	
	4.30 p.m.	105.7	...	...	Ax.	
	5.30 p.m.	105.6	...	...	Ax.	
	6.0 p.m.	106.4	122	44	Ax.	Quin. 3j.
	6.25 p.m.	106.2	112	44	Ax.	
	6.45 p.m.	106.6	104	42	Ax.	Quin. 3j.
	7.5 p.m.	106.2	108	40	Ax.	
	7.20 p.m.	106.2	112	40	Ax.	Quin. 3j.
	7.35 p.m.	106.4	112	38	Ax.	
	7.50 p.m.	106.9	120	40	Ax.	Quin. 3j.
	8.5 p.m.	107.1	118	42	Ax.	
	8.20 p.m.	107.3	116	40	Ax.	Quin. 3j.
	8.40 p.m.	107.6	112	36	Ax.	
	8.55 p.m.	107.8	120	34	Ax.	Quin. 3j. Vomited.
	9.15 p.m.	108.4	122	32	Ax.	Unconscious.
	9.30 p.m.	109.2	136	36	Ax.	Bath, 96°.
	9.50 p.m.	109.1	...	...	Rec.	
	9.55 p.m.	110.0	...	...	Rec.	Iced water poured
	10.10 p.m.	109.4	...	...	Rec.	over patient.
	10.15 p.m.	108.4	...	...	Rec.	
	10.20 p.m.	107.5	120	...	Rec.	Spinal icebag.
	10.25 p.m.	106.2	140	...	Rec.	Partly conscious.
	10.30 p.m.	104.0	...	...	Rec.	
	10.35 p.m.	103.6	...	...	Rec.	Taken from bath.
	10.50 p.m.	101.5	...	...	Rec.	Temp. 63°.
	10.55 p.m.	100.6	...	...	Rec.	Patient can speak.
	11.5 p.m.	99.5	...	...	Rec.	Rigidity of lips and
	11.10 p.m.	99.5	...	...	Vag.	of muscles of neck.
	11.25 p.m.	97.4	130	...	Vag.	
	11.40 p.m.	97.4	...	...	Vag.	Pulse imperceptible;
	11.55 p.m.	98.0	...	...	Vag.	warmth to feet and
	12.2 a.m.	98.2	...	...	Vag.	spine.
June 11. 15th day.	12.20 a.m.	98.3	130	42	Vag.	
	12.35 a.m.	98.3	...	...	Vag.	
	12.45 a.m.	...	120	...		
	12.55 a.m.	98.9	...	...	Vag.	
	1.15 a.m.	99.4	188	32	Vag.	Asleep.
	1.40 a.m.	99.2	...	...	Ax.	

Date	Hour	Temp.	Pulse	Resp.	Remarks
BROPHY—cont. June 11—cont.	2.15 a.m.	101.1	...	...	Ax.
	2.55 a.m.	101.4	116	40	Vag.
	4.0 a.m.	102.4	108	36	Ax.
	5.0 a.m.	102.9	...	...	Ax.
	6.30 a.m.	103.4	...	...	Ax.
	7.15 a.m.	103.8	...	...	Ax.
	7.35 a.m.	104.5	...	...	Rec.
	7.40 a.m.				Bath, 64°.
	7.45 a.m.	105.0	...	...	Vag.
	7.50 a.m.	104.6	...	...	Vag.
	8.0 a.m.	103.9	...	...	Vag.
	8.7 a.m.	102.0	...	...	Vag.
	8.15 a.m.	101.7	...	...	Vag.
	8.30 a.m.	100.8	...	...	Vag.
	8.40 a.m.	99.4	108	Mouth	Rigor; warm bottles. Rigor.
	8.50 a.m.	{ 99.9 } { 99.8 }	84	25	{ Rec. { Mou.
	9.10 a.m.	99.4	...	...	Mouth
	9.40 a.m.	99.9	...	...	Mouth
	10.0 a.m.	100.0	...	...	Mouth
	10.45 a.m.	100.4	...	...	Mouth
	12.15 p.m.	100.7	...	...	Mouth
	1.45 p.m.	100.9	...	...	Ax.
	3.0 p.m.	100.7	96	30	Ax.
	12.15 a.m.	101.2	...	...	Ax.
	1.0 a.m.	100.8	...	...	Ax.
	4.0 a.m.	101.0	...	...	Ax.
	7.30 a.m.	100.2	...	...	Ax.
	9.40 a.m.	99.8	...	...	Ax.
	10.30 a.m.	100.7	...	...	Ax.
	3.10 p.m.	101.3	120	...	Ax.
	8.50 p.m.	102.1	...	...	Ax.
	9.20 p.m.	102.2	...	...	Ax.
	9.45 p.m.				Ice-bag to spine, 3 hours.
	9.55 p.m.	101.6	...	...	Mouth
	11.45 p.m.	101.8	...	...	Ax.
	12.40 a.m.	101.0	...	...	Mouth
	12.55 a.m.	100.5	100	30	Mouth
	1.25 a.m.	101.6	...	...	Ax.
	4.40 a.m.	101.6	...	...	Ax.
	5.10 a.m.	102.4	...	...	Ax.
	5.40 a.m.	101.5	...	...	Ax.
	8.15 a.m.	100.9	...	...	Ax.
	8.50 a.m.	101.2	104	26	Ax.
	9.50 a.m.	101.9	...	...	Ax.
	12.0 noon	102.5	...	...	Ax.
	12.48 p.m.	102.6	...	...	Ax.
	2.53 p.m.	101.4	...	...	Ax.
	3.55 p.m.	101.7	...	...	Ax.
	4.45 p.m.	101.8	...	...	Ax.
	6.15 p.m.	102.2	...	...	Ax.
	10.0 p.m.	101.9	96	32	Ax.
	2.0 a.m.	101.4	...	...	Mouth
	3.0 a.m.	101.0	...	...	Ax.
	6.0 a.m.	101.6	...	...	Ax.
	8.0 a.m.	101.8	...	...	Ax.
	8.30 a.m.				Ice-bag removed. Ice-bag, 1½ hour.

Date	Hour	Temp.	Pulse	Resp.		Remarks
BROPHY—cont.	9.20 a.m.	101.8	...	...	Mouth	Ice-bag removed.
June 14—cont.	10.0 a.m.	102.1	...	...	Ax.	
	10.25 a.m.	102.1	...	...	Ax.	
	11.25 a.m.	101.5	...	...	Ax.	
	2.50 p.m.	101.3	...	...	Ax.	
	3.40 p.m.	102.1	...	...	Ax.	
	4.30 p.m.	101.7	...	...	Ax.	
	6.0 p.m.	102.2	...	...	Ax.	8 p.m. Râles in lungs.
	11.0 p.m.	102.8	...	...	Ax.	[base.
June 15.	2.30 a.m.	103.2	...	...	Ax.	Some dulness, right
19th day.	3.0 a.m.	102.6	...	...	Ax.	Ice-bag applied 6½
104 hours.	4.0 a.m.	102.0	...	...	Ax.	hours.
5th day.	5.0 a.m.	101.8	...	...	Ax.	"
	7.0 a.m.	102.4	...	...	Ax.	"
	8.45 a.m.	101.4	...	...	Ax.	"
	9.40 a.m.	101.7	96	...	Ax.	Ice-bag removed; not
	10.30 a.m.	100.5	...	...	Ax.	again applied.
	12.15 p.m.	101.8	...	...	Ax.	9 a.m. Dulness, right
	1.15 p.m.	102.3	...	...	Ax.	base, disappeared;
	3.15 p.m.	102.7	...	...		still râles in lungs.
	7.15 p.m.	101.9	...	...
	8.30 p.m.	102.7	...	...
	11.30 p.m.	101.8	...	...
June 16.	12.30 a.m.	102.4	...	...
20th day.	4.0 p.m.	100.0	...	...
6th day.	11.30 p.m.	99.8	...	...
June 17. 21st day.	2.0 a.m.	99.8	...	...		17th. Sibilant râles in
7th day.	10.35 p.m.	98.4	...	...		lungs.
June 18. 22d day.	8.45 a.m.	99.1	...	...
8th day.	9.0 p.m.	99.2	88	24		
June 19. 23d day.	11.0 a.m.	98.2	...	...		22. Râles disappeared
9th day.	10.0 p.m.	98.4	...	...		from lungs.
July 1. 35th day.	M.	100.0	...	...
18th day.	E.	98.5	...	...

No. II.—CALEY.

Date	Hour	Temp.	Pulse	Resp.		Remarks
1871						
June 6. 11th day.	9.0 p.m.	102.6	100	24		
" 7.	10.45 a.m.	102.2	84	28	...	Cardiac dulness to
	11.0 p.m.	103.1	90	27		2nd left cartilage;
" 8.	10.45 a.m.	102.0	96	32		friction.
	9.0 p.m.	104.4	100	26	...	Cough, with bloody
						sputa.
" 9.	11.0 a.m.	102.8	104	40	...	Dulness base right
	9.0 p.m.	103.2	116	36		lung.
" 10.	11.0 a.m.	103.1	96	38	...	Dulness left base.
" 11.	11.0 a.m.	103.1	96	38		
	9.0 p.m.	103.1	124	48		
" 12. 17th day.	11.0 a.m.	102.0	104	36		

Date	Hour	Temp.	Pulse	Resp.		Remarks
CALEY—cont.	9.0 p.m.	105.6	92	44	...	Delirium began at 8 p.m.
June 12—cont.	9.5 p.m.	105.7	...	...		Tongue dry, face and eyes suffused. Alæ nasi act strongly.
	10.0 p.m.	105.8	...	...		Quinine 3ss.
	10.20 p.m.	...	...	...
	10.30 p.m.	105.8	...	...
" 13.	12.20 a.m.	106.5	...	...
18th day.	12.40 a.m.	106.8	...	...
	1.0 a.m.	106.7	...	...
	1.10 a.m.	106.8	108	46	...	No perspiration.
	1.42 a.m.	107.0	...	...	...	1.58 bath, temp. 89°.
	2.4 a.m.	107.3	108	40	Rec.	
	2.11 a.m.	105.2	96	...	Rec.	Sensible. Dyspnoæaless.
	2.23 a.m.	103.1	90	...	Rec.	Taken from bath.
	2.33 a.m.	99.1	84	36	Rec.	
	2.48 a.m.	98.0	80	20	Mouth	Hot bag to back.
	3.5 a.m.	97.8	...	...	Mouth	
	3.40 a.m.	98.7	...	...	Mouth	
	4.5 a.m.	98.7	...	...	Mouth	
	4.30 a.m.	99.7	100	32	Mouth	Hot bag removed. No perspiration.
	5.5 a.m.	100.2	...	...		Ice-bag 3 hours.
	6.55 a.m.	101.9	...	...	Ax.	Ice-bag removed.
	9.50 a.m.	100.9	92	34	Mouth	
	10.50 a.m.	101.9	82	20		
	11.30 a.m.	102.2	88	32	...	11.40 ice-bag 2 hours.
	4.30 a.m.	...	...	...	...	No reduct. of temp.
	6.15 p.m.	100.9	...	...	Mouth	till 7 p.m. Quinine, gr. x.
	7.15 p.m.	102.2	...	...	Mouth	Ice-bag 14 hours.
	8.20 p.m.	101.9	...	...	Mouth	
	10.20 p.m.	102.5	100	36	Mouth	Quinine, gr. x.
	11.40 p.m.	102.8	...	...	Mouth	
June 14.	1.40 a.m.	102.9	...	...	Mouth	
19th day.	6.30 a.m.	101.8	...	...	Mouth	
24 hours.	9.0 a.m.	102.2	84	...	Mouth	Ice-bag removed. Has taken quinine gr. xxx. since last night.
	10.30 a.m.	101.5	...	...		Cardiac dulness, 1st rib.
	11.0 a.m.	102.3	84	42		
	12.5 p.m.	102.7	...	...	Ax.	Ice-bag 3½ hours.
	3.30 p.m.	102.8	88	30		Ice-bag removed.
	4.5 p.m.	102.6	...	...	...	Cardiac dulness to clavicle; no perspiration; slight pain in joints.
	7.45 p.m.	101.1	...	...
	8.30 p.m.	101.6	...	...
	10.0 p.m.	101.2	...	...
	11.30 p.m.	102.2	...	...
June 15.	2.0 a.m.	103.0	...	...
20th day.	3.30 a.m.	103.6	...	...	Ax.	Ice-bag 5½ hours.
48 hours.	5.30 a.m.	103.2	...	...
3rd day.	6.30 a.m.	103.5	...	...
	7.0 a.m.	102.7	...	...	Mouth	
	9.0 a.m.	102.8	...	...	Ax.	Ice-bag removed.
	10.30 a.m.	103.4	96	...		
	2.45 p.m.	103.4	...	...	Ax.	Moisture on face.
	3.45 p.m.	103.6	...	...
	6.15 p.m.	102.8	...	...		Ice-bag 16 hours.
	10.0 p.m.	103.5	96	32		
June 16.	4.0 a.m.	103.9	...	...		Ice-bag refilled.
21st day.	4.40 a.m.	104.3	...	...	Ax.	Bath at 4.47; temp. 96°; cooled in 45 min. to 78°.
72 hours.	4.49 a.m.	105.4	...	...	Rec.	
4th day.						

Date	Hour	Temp.	Pulse	Resp.	Remarks
CALEY—cont. June 16—co t.	4.55 a.m.	105.1	...	...	Rec. Bath 91°.
	5.5 a.m.	104.4	...	...	Rec. " 89°.
	5.10 a.m.	104.2	...	...	Rec. " 87°.
	5.15 a.m.	104.1	...	...	Rec. " 86°.
	5.20 a.m.	104.0	...	...	Rec. " 82°.
	5.25 a.m.	103.1	...	...	Rec. " 79°.
	5.30 a.m.	102.6	...	...	Rec. " 78°.
	5.35 a.m.	101.9	92	28	Rec. Taken from bath 5.32.
	5.40 a.m.	100.5	...	...	Mouth
	5.45 a.m.	99.5	...	...	Mouth
	5.50 a.m.	98.5	...	...	Mouth
	5.55 a.m.	98.7	...	...	Mouth
	6.0 a.m.	99.7	...	...	Mouth
	6.40 a.m.	99.5	...	...	Mouth Perspiration on face.
	7.10 a.m.	100.0	...	...	Ax.
	7.45 a.m.	101.8	...	...	Ax.
	8.0 a.m.	102.4	...	...	Ax. Ice-bag, 1 hr. 20 min.
	8.45 a.m.	103.0	...	...	Ax.
	9.0 a.m.	103.2	104	...	Ax. Quinine, gr. ij. every
	9.20 a.m.	103.6	...	44	Ax. hour.
	10.0 a.m.	104.2	...	...	Rec. Bath 95°.
	10.10 a.m.	104.2	...	...	Rec. " 93°.
	10.15 a.m.	104.0	...	...	Rec. " 89°.
	10.28 a.m.	103.6	...	...	Rec. " 87°.
	10.45 a.m.	102.7	...	...	Rec. Taken from bath, 87°.
	10.50 a.m.	102.2	...	...	Rec.
	11.20 a.m.	100.4	...	...	Mouth
	11.30 a.m.	100.7	...	...	Mouth
	11.40 a.m.	100.8	...	...	Mouth Pack, 2 hours.
	12.15 p.m.	100.4	...	...	Mouth Not changed.
	12.35 p.m.	101.8	...	...	Mouth
	1.50 p.m.	102.4	92	40	Mouth Pack taken off.
	2.50 p.m.	104.5	...	...	...
	3.10 p.m.	104.5	...	...	Mouth
	3.25 p.m.	105.3	...	...	Rec. Bath 3.25, 101°.
	3.30 p.m.	105.0	...	...	Rec. " 99°.
	3.40 p.m.	104.8	...	...	Rec. " 96°.
	3.50 p.m.	104.0	...	...	Rec. " 82°.
	3.55 p.m.	103.8	...	...	Rec. " 82°.
	4.0 p.m.	103.0	...	...	Rec. " 82°.
	4.10 p.m.	102.3	...	...	Rec. Warm water 87°.
	4.20 p.m.	101.0	100	36	Rec. " 82°.
	4.30 p.m.	100.8	...	...	Rec. Rigor 82°.
	4.50 p.m.	100.4	...	...	Rec. " 88°.
	5.30 p.m.	100.2	...	42	Rec. " 100°.
	5.35 p.m.	101.6	...	...	Rec. " 86°.
	6.5 p.m.	102.2	112	42	Rec. " 97°.
	6.15 p.m.	102.2	...	...	Rec.
	6.30 p.m.	102.3	120	44	Rec. 6.30. Taken from bath
	6.35 p.m.	...	108	40	owing to oppression
					in breathing; 97°.
	7.55 p.m.	102.8	...	...	Ice-bag, 2 hours;
	8.55 p.m.	104.0	...	...	whole left side in
					front delt from base
					to apex; p.p.s.
					very dichroous.

Date	Hour	Temp.	Pulse	Resp.		Remarks
CALEY—cont. June 16—cont.	10.0 p.m.	103.7	...	...	Ax.	10.10. Bath 100°.
	10.15 p.m.	104.5	...	...	Rec.	" 88°.
	10.22 p.m.	104.6	...	...	Rec.	" 83°.
	10.27 p.m.	104.5	...	...	Rec.	" 80°.
	10.33 p.m.	104.4	...	...	Rec.	" 78°.
	10.40 p.m.	102.7	...	...	Rec.	" 77°.
	10.50 p.m.	102.0	...	...	Rec.	taken out 77°.
	10.55 p.m.	99.2	...	...	Rec.	
	11.15 p.m.	98.6	104	44	Mouth	
	11.20 p.m.	98.3	...	...	Ax.	
June 17, 22nd day 96 hours. 5th day.	11.45 p.m.	98.0	...	...	Ax.	Rigor; hot bottles.
	12.15 a.m.	99.0	...	...	Ax.	
	12.30 a.m.	100.1	...	...	Ax.	
	12.45 a.m.	100.5	...	...	Ax.	
	1.0 a.m.	101.1	...	...	Ax.	
	3.20 a.m.	102.6	...	...	Ax.	
	3.20 a.m.	102.6	...	...	Ax.	3.23 bath, 81°.
	3.28 a.m.	103.8	...	...	Rec.	
	3.33 a.m.	103.3	128	40	Rec.	
	3.40 a.m.	103.0	...	...	Rec.	
	3.45 a.m.	102.0	...	...	Rec.	
	3.50 a.m.	101.6	...	...	Rec.	3.50, taken out; tem-
	3.55 a.m.	100.1	...	...	Mouth	perature of bath
	4.5 a.m.	99.5	...	...	Mouth	83°.
	4.12 a.m.	99.2	...	...	Mouth	
	4.30 a.m.	98.2	...	...	Ax.	
	4.45 a.m.	98.4	...	...	Ax.	
	5.10 a.m.	99.3	...	...	Ax.	
	5.50 a.m.	100.3	...	...	Ax.	
	6.30 a.m.	101.2	...	...	Ax.	
	6.45 a.m.	102.0	...	...	Ax.	Moisture on face.
	7.10 a.m.	101.2	...	...	Ax.	Slight wandering.
	8.5 a.m.	101.6	...	...	Ax.	Packed.
	8.25 a.m.	102.4	...	...	Ax.	Pack renewed.
	8.55 a.m.	101.6	...	...	Ax.	
	9.15 a.m.	101.4	104	36	Ax.	Cardiac dulness di-
	10.10 a.m.	102.0	...	...	Ax.	minished in trans-
	11.10 a.m.	102.3	...	...	Mouth	verse diameter;
	11.35 a.m.	102.2	108	36	Mouth	dulness in lungs
						less.
	11.45 a.m.		...	...	...	Bath 91°.
	11.57 a.m.	103.4	...	...	Rec.	
	12.2 p.m.	103.2	...	...	Rec.	" 80°.
	12.14 p.m.	102.6	...	...	Rec.	" 76°.
	12.20 p.m.	101.4	...	...	Rec.	Taken out of bath,
	12.25 p.m.	100.0	...	...	Mouth	75°.
	12.32 p.m.	99.2	...	...	Mouth	
	12.42 p.m.	98.6	...	...	Mouth	Shivering.
	1.20 p.m.	98.6	...	...	Mouth	
	2.10 p.m.	100.1	...	...	Mouth	
	2.40 p.m.	100.6	96	24	Mouth	Pack.
	3.10 p.m.	100.7	...	...	Mouth	Pack.
	3.50 p.m.	101.0	...	...	Mouth	Packed in iced towels,
	4.50 p.m.	100.9	...	...	Mouth	changed every half
	6.20 p.m.	101.6	104	20	Mouth	hour or 20 minutes
	7.40 p.m.	102.0	...	...	Mouth	for 17 hours, till
	9.15 p.m.	101.6	...	...	Mouth	8 a.m. on 18th.

Date	Hour	Temp.	Pulse	Resp.		Remarks
CALEY—cont.	10.0 p.m.	102.0	...	...	Ax.	Tracheal r�le; intense
June 17—cont.	10.20 p.m.	102.2	100	22	Mouth	prostration; brandy
	10.45 p.m.	101.9	...	...	Mouth	3j every half hour.
June 18.	12.10 a.m.	102.1				
23rd day.	12.45 a.m.	101.8				
120 hours.	1.10 a.m.	101.1				
5th day.	2.10 a.m.	102.2				
	3.15 a.m.	101.8				
	4.45 a.m.	101.7				
	5.45 a.m.	102.3				
	6.45 a.m.	101.2	...	...	Mouth	
	7.0 a.m.	100.9	...	...	Mouth	
	8.0 a.m.	100.2	...	...	Mouth	8 a.m., pack left off.
	9.50 a.m.	100.8	96	27	...	Can turn himself in
	11.0 a.m.	100.6				bed; feels better;
						pulse less dichrotic.
	12.15 p.m.	100.5	...	...	...	Ice pack resumed
	2.30 p.m.	101.6				8½ hours, till 8.30
	5.50 p.m.	102.5				p.m., with frequent
	6.55 p.m.	101.8				changes.
	7.55 p.m.	100.8				
	8.30 p.m.	100.8	...	...	...	Pack left off; lungs
						more resonant.
	10.45 p.m.	101.6	...	...	...	Iced pack resumed
June 19.	12.15 a.m.	101.8				throughout night,
24th day.						11 hours.
7th day.	2.30 a.m.	101.8	...	...	...	Perspiration on face.
	4.0 a.m.	100.8				
	7.30 a.m.	100.5				
	8.45 a.m.	101.2	...	...	...	Pack removed; car-
	9.45 a.m.					diac dulness has
						fallen to 1st rib.
	11.0 a.m.	101.2	108	36	...	Sweating profusely.
	12.	101.9	...	...	...	Sweating ceased.
	12.50 p.m.	102.8				
	1.5 p.m.	...	...	...	...	Ice pack, 3½ hours.
	1.20 p.m.	102.7				
	2.20 p.m.	101.8				
	4.0 p.m.	100.8	120	40		
	4.45 p.m.	...	...	...	...	Pack removed.
	5.0 p.m.	101.4				
	6.40 p.m.	102.2				
	7.20 p.m.	102.9	...	...	...	Bath 97°.
	7.25 p.m.	103.4	...	...	Rec.	
	7.40 p.m.	103.5	...	...	Rec.	" 89°.
	7.45 p.m.	102.3	...	...	Mouth	
	7.50 p.m.	102.2	...	...	Mouth	" 86°. Taken out
	7.57 p.m.	101.6	...	...	Mouth	of bath; breath
	8.10 p.m.	102	...	...	Mouth	short; shivering.
	9.0 p.m.	102	...	...	Mouth	
	9.45 p.m.	102.8	112	28	Mouth	
	11.30 p.m.	103.3	...	...	Mouth	Pack, 8½ hours.
June 20.	12.30 a.m.	102.8	...	...	Mouth	
25th day.	1.30 a.m.	103.2	...	...	Mou.?	Pack.
8th day.	2.15 a.m.	102.3	...	...	Mou.?	Pack.
	3.15 a.m.	102.2	...	...	Mou.?	Pack.

Date	Hour.	Temp.	Pulse	Resp.		Remarks
CALEY— <i>cont.</i>	3.45 a.m.	102.6	...	...	Mou.?	Pack.
June 20— <i>cont.</i>	4.15 a.m.	102.8	...	...	Mou.?	Pack.
	5.15 a.m.	101.8	...	...	Mou.?	Pack.
	8.0 a.m.	100.7	...	...	Mou.?	Pack left off, 8.15.
	8.50 a.m.	102.2	106	24	...	Not resumed.
	10.0 a.m.	100.8				
	11.55 a.m.	102.2				
	4.25 p.m.	102.3				
	4.55 p.m.	101.6				
	8.0 p.m.	102				
	10.20 p.m.	103.1				
June 21.	12.30 a.m.	102.2				
26th day.	3.30 a.m.	101.7				
9th day.	5.45 a.m.	101.2				
	7.0 a.m.	101.6	...	...	...	Sweating freely.
	9.0 a.m.	101.3				
	12.10 p.m.	102.4				
	1.40 p.m.	103.6	...	...	...	Profuse sweating several hours; pain right knee.
	5.0 p.m.	103.4	120	32		
	10.15 p.m.	102.2				
June 22.	12.40 a.m.	102.5				
27th day.	3.15 a.m.	103				
10th day.	4 to 5 a.m.	103.7	136	46		
	6.0 a.m.	102.8	116	34	...	Sweating; pains in both knees and one hand.
	11.30 a.m.	102.4	104			
	3.45 p.m.	103.0				
	4.35 p.m.	102.4				
	8.55 p.m.	103.2				
	10.10 p.m.	103.5				
	11.50 p.m.	102.9				
June 23.	2.40 a.m.	101.9				
28th day.	6.45 a.m.	102.8				
11th day.	2.40 p.m.	102	...	...	...	Cardiac dulness, upper edge second rib. Pain left knee.
	4.30 p.m.	101.8				
	8.30 p.m.	103				
June 24.	12.0	101.6				
29th day.	5.0 a.m.	102.5				
12th day.	7.0 a.m.	100.9				
	9.0 a.m.	100.7	100	32		Boiled sole for dinner.
	10.35 a.m.	101.2				
	1.50 p.m.	102.2				
	11.30 p.m.	102.3				
June 25.	2.30 a.m.	100.7				
30th day.	7.30 a.m.	99.8				
13th day.	12.0	101.3	103	34		
	9.30 p.m.	101.9				
	11.30 p.m.	100.8				
June 26.	12.30 a.m.	100.8				
31st day.	8.0 a.m.	99.7				
14th day.	3.0 p.m.	100.6	112	...	...	Œdema of hands, feet, and eyelids disappeared.
	4.0 p.m.	101.0	...			
	9.0 p.m.	101.7	114	32		
June 27.	1.0 a.m.	100.4	...			
32nd day.	10.25 a.m.	100.2	100	24	...	Cardiac dulness, level 3rd cartilage; friction.
15th day.	4.0 p.m.	101.5				
	11.0 p.m.	101.9				
June 28. 33rd day.	12.30 a.m.	101.0				
16th day.	2.0 a.m.	101.7				

Date	Hour	Temp.	Pulse	Resp.		Remarks
CALRY— <i>cont.</i>	9.0 a.m.	99.4	...	...	...	Apex in 4th intsp.
June 28— <i>cont.</i>	12.0 a.m.	101.1				$\frac{1}{2}$ -inch outside nipple.
	11.0 p.m.	101.9				
June 29. 34th day.	1.30 a.m.	100.7				
17th day.	8.40 a.m.	99.3	...	...	...	Apex in 5th instp.
	12.45 p.m.	100.4	112	28		$\frac{3}{4}$ -inch outside nipple; epistaxis.
	6.15 p.m.	101.0	112	32		
	9.30 p.m.	102.5				
June 30. 35th day.	12.30 a.m.	101.9				
18th day.	10.20 a.m.	99.7	112	32		
	8.30 p.m.	100.6				
July 1. 36th day.	10.30 a.m.	98.8	...	...	...	Friction disappeared from heart; no murmur.
19th day.	7.0 p.m.	100.0	118	30		
July 2. 37th day.	M.	99.2	90	28		
20th day.	E.	100.3	108	24		
July 3. 38th day.	M.	99.4	88	18		
21st day.	E.	101.2	108	24		
July 4. 39th day.	M.	99.6	100	22		
22nd day.	E.	101.0				
July 5. 40th day.	M.	99.8	108	20	...	Some friction base of right lung; res. imperfect here; left healthy.
23rd day.						
July 6. 41st day.	M.	98.8				
24th day.	E.	100.8	100	20		
July 7. 42nd day.	E.	100.6				
25th day.						
July 8. 43rd day.	M.	98.6				
26th day.	E.	100.2				
July 9. 44th day.	M.	99.3	108	20	...	Pains in right hand and shoulder.
27th day.	E.	99.5				
July 10. 45th day.	M.	99.4				
28th day.	E.	99.8	...	...	...	No pain; heart's apex 5th intsp. vertically below nipple; dulness 3rd cart.; no murmur.
July 11. 46th day.	M.	99.0	104	20		
29th day.	E.	99.3				
July 12. 47th day.	M.	99.0	104	26		
30th day.	E.	99.6	96			
July 13. 48th day.	M.	98.8	96	20	...	Heart's dulness, upper margin, 4th rib.
31st day.	E.	99.8				
July 14. 49th day.	M.	98.6	106	20		
32nd day.	E.	99.6	92			
July 15. 50th day.	M.	98.4	98	18		
33rd day.	E.	99.0				
July 16. 51st day.	M.	99.0				
34th day.	E.	101.0	92	24		
July 17. 52nd day.	M.	98.8	98	24	...	Can stand and walk; weight, 8st. 1 $\frac{1}{2}$ lbs.
35th day.	E.	100.8				
July 18. 53rd day.	M.	100.8	98	20		
36th day.	E.	101.3				
July 19. 54th day.	M.	100.2	86	22		
37th day.	E.	101.2				
July 20. 55th day.	M.	98.4	90	24		
38th day.	E.	100.0				
July 21. 56th day.	M.	98.4	88	20	...	Nodes in head.
39th day.	E.	99.8	92	18		
July 22. 57th day.	M.	99.4	104	22		
40th day.						
July 24. 59th day.	M.	99.6	100	20	...	Weight, 8st. 6lbs.
42nd day.	E.	100.4				

Discharged July 30. 64th day; 48th day after hyperpyrexia.

ANALYSES OF URINE.

BROPHY.

9 a.m. to 9 a.m.	Temperature			Urea	Urine in 24 hours			Mer. sol. used	
	Max.	Min.	Mean	Grains	Oz.	O.C.	Sp. gr.	Total	Chlorides
June 8-9	100·7		100·5						
" 9-10	101·2	99·2	100·7						
" 10-11	110·0	97·4	103·4						
" 11-12	101·2	99·4	100·8						
" 12-13	102·4	99·8	101·4						
" 13-14	102·6	101·0	101·8						
" 14-15	103·2	101·3	102·1						
" 15-16	102·7	100·5	102·2	433	86	2,250	1,014	12·5	
" 16-17	101·7	99·5	100·4	341	106	2,770	1,011	8·0	
" 17-18	99·6	98·4	98·9	396	104	2,710	1,012	9·5	
" 18-19	99·2	98·2	98·8	208	49	1,290	1,014	10·5	
" 19-20	98·4	98·2	98·3	292	93	2,430	1,010	8·6	·8
" 20-21	99·6	98·0	98·8	283	69	1,790	1,013	11·0	·7
" 21-22	98·2	97·6	97·9	351	107	2,780	1,010	8·7	·5
" 22-23	98·7	98·2	98·5	317	84	2,190	1,011	10·2	·8
" 23-24	...	...	98·0	381	127	3,300	1,010	8·1	·6
" 24-25	...	...	98·3	266	71	1,860	1,017	10·0	·7
" 25-26	...	...	98·2	243	77	2,000	1,010	8·4	·5
" 26-27	...	...	98·7						
" 27-28	...	...	99·0						
" 28-29									
" 29-30	...	...	98·1						

CALEY.

[illegible]

TABLE SHOWING THE EFFECT OF THE BATHS IN THE REDUCTION OF TEMPERATURE.

BROPHY.

FIRST BATH.

Time in bath	Rise or fall	Temp.	Temp.	Amount of reduction	Time	Average reduction per minute degrees	Remarks
15m.*	fall	0.6	110°				* Iced water
5m.	"	1.0					
5m.	"	0.9					
5m.	"	1.3					
5m.	"	2.2					
5m.	"	0.4	103.6	6.4	40m.	0.16	
AFTER BATH.	"						
15m.	"	2.1					
10m.	"	2.0					
20m.	"	2.1	97.4	6.2	45m.	0.13	

SECOND BATH.

Time after immersion	Rise or fall	Temp.	Temp.	Amount of reduction	Time	Average reduction per minute degrees	Remarks
10m.	rise	0.5	104.5 to 105				Bath 64°, rose to 66°.
5m.	fall	0.4					
10m.	"	0.7	103.9	1.1	15m.	0.07	
AFTER BATH.	"						
7m.	"	1.9					
8m.	"	0.3					
15m.	"	0.9					
10m.	"	1.4*	99.4	4.5	40m.	0.11	* Mouth.

CALEY.

FIRST BATH.

Time in bath	Rise or fall	Temp.	Temp.	Amount of reduction	Time of reduction	Average fall per minute degrees	Remarks
22m.	rise	0.3	107.0 to 107.3				Temp. bath 89°, cooled to 86°.
7m.	fall	2.1					
12m.	"	2.1*	103.1	4.2	19m.	0.23	* Rectum. † Mouth.
AFTER BATH.	fall	4.0*					
10m.	"	1.1†					
15m.	"	0.2*	97.8	5.3	42m.	0.15	

SECOND BATH—4TH DAY.

Time in bath	Rise or fall	Temp.	Temp.	Amount of reduction	Time	Average fall per minute degrees	Remarks
8m.*	fall	0.3					<p>* <i>Qy</i> rise of 1.1? Temp. 3 minutes before immersion 104.3 axilla, 9 min. after immersion, 105.4 rectum; temp. of bath 96°, cooled to 78°.</p>
5m.	"	0.3	105.4†				
6m.	"	0.4					
5m.	"	0.2					
5m.	"	0.1					
5m.	"	0.1					
5m.	"	0.9					
5m.	"	0.5	102.6†	2.8	43m.	0.65	
AFTER BATH.							
5m.	fall	0.7†					†Rectum.
5m.	"	1.4†					
5m.	"	1.0†					‡Mouth.
5m.	"	1.0†	98.7†	4.4	20m.	0.2	

THIRD BATH—4TH DAY.

Time in bath	Rise or fall	Temp.	Temp.	Amount of reduction	Time	Average fall per minute degrees	Remarks
15m.	fall	0·2	104·2				No rise of temp. after immersion; temp. of bath 95°, cooled to 86°.
13m.	"	0·4					
7m.	"	0·4					
5m.	"	0·2					
5m.	"	0·3	102·7*	1·5	55m.	0·027	
<i>AFTER BATH.</i>							
5m.	fall	0·5*					*Rectum.
10m.	"	0·8†	100·4†	1·3	15m.	0·08	†Mouth.

FOURTH BATH—4TH DAY.

[illegible]

FIFTH BATH—4TH DAY.

Time in bath	Rise or fall	Temp.	Temp.	Amount of reduction	Time	Average fall per minute degrees	Remarks
7m.*	rise	0.1	104.6				* Qy. rise of temp. in bath? Temp. 10 min. before immersion 103.7° axilla, 5 min. after immersion 104.5° rectum. Temp. of bath 100°, cooled to 70°.
5m.	fall	0.1					
6m.	"	0.1					
7m.	"	0.7					
10m.	"	0.7	102.0†	2.6	28m.	0.099	
AFTER BATH.							
5m.	fall	1.8†					† Rectum.
10m.	"	0.6†					† Mouth.
5m.	"	0.3§					§ Axilla.
25m.	"	0.3§	98.0	4.6	45m.	0.102	

SIXTH BATH—5TH DAY.

Time in bath	Rise or fall	Temp.	Temp.	Amount of reduction	Time	Average fall per minute degrees	Remarks
8m.	rise?	0.8	102.6* to 103.8†				* Axilla, before bath. † Rectum. Temp. of bath 81°, rose to 83°.
5m.	fall	0.5					
7m.	"	0.3					
5m.	"	1.0					
5m.	"	0.4	101.6	2.2	22m.	0.1	
AFTER BATH.							
5m.	fall	1.5†					† Mouth.
10m.	"	0.6†					
7m.	"	0.3†					
18m.	"	1.0§	98.2§	3.4	40m.	0.08	§ Axilla.

SEVENTH BATH—5TH DAY.

Time in bath	Rise or fall	Temp.	Temp.	Amount of reduction	Time	Average fall per minute degrees	Remarks
17m.*	fall	0.2	103.4				* Qy. a rise of 1.2°. Prev. temp. 10 min. before put into bath, in mouth, 102.2°; temp. of bath 91°, cooled to 76°.
6m.	"	0.2					
6m.	"	0.4					
6m.	"	1.2	101.4	2.0	35m.	0.05	
AFTER BATH.							
5m.	fall	1.4†					† Mouth.
7m.	"	0.8†					
10m.	"	0.6†	98.6	2.8	22m.	0.127	

EIGHTH BATH—8TH DAY.

Time in bath	Rise or fall	Temp. .	Temp.	Amount of reduc- tion	Time	Average fall per minute degrees	Remarks
5m.	rise ?	0·6	102·9 to 103·4*				<i>Qy. prev. temp. in Mouth.</i>
15m.	rise	0·1	103·5				* Rectum.
5m.	fall	1·2	102·3	1·2	5m.	0·24	25 minutes in bath.
<i>AFTER BATH.</i>							
5m.	fall	0·1					
7m.	"	0·6	101·6†	0·7	12m.	0·058	† Mouth.

ANALYSIS OF TWENTY-TWO CASES OF HYPERTYXIA IN ACUTE RHEUMATISM.

Ref.	Sex	Age	No. of Attacks	Duration before extreme Pyrexia	Character of Disease	Total duration of rise	Duration after extreme fever	Temp. at death	Temp. F.M.	General symptoms of attack	Sweating during course of Pyrexia	Joints, pain	Post-mortem	Remarks and Treatment
I. Ringer. <i>Med. T. & Gaz.</i> , 1887.	F.	20	1st.	3 weeks slight rheumatic pains; 9 days severe illness.	Severe; both constitutional and local; T. 104° 5 days before death; 103° 4 days.	9½ hours; T. 105° to 109°.	6½ hours; from T. 106° to death in ½ hour after 109°.	109°.	?	(1) Restlessness; (2) Delirium; (3) Coma.	?	0	Pericarditis; mod. inflammation of joints; congestion of lungs and kidneys; enlargement of spleen; brain healthy.	Mist. Camph. Opium.
II. Ringer. Ib.	M.	23	1st.	14 days.	Severe; T. 103°.	12 hours; T. 105° to 110°.	? 1 hour; from T. 109°.	110°.	?	Thirst; much water passed in night before death; 4800 cr. 45-6 grammes urea; delirium passing into coma; cyanosis and pallor.	?	0	Slight pericarditis; slight vegetations on valves; lungs congested; blood fluid; brain and other organs healthy.	Alkaline Opiales.
III. Ringer. Ib.	F.	29	1st.	Pains in joints, slight, for some months.	Moderate; T. 101° to 102°.	16 hours; T. 104° to 110°.	4½ hours; T. from 107° to 110°.	110°.	?	Delirium (1); coma (2); irregular, hurried breathing; lividity.	?	?	Pericarditis; softening of heart's tissue; ecchymosis of heart; lungs congested; liver and kidneys congested; joints healthy; brain and other organs healthy.	Alkaline opium; bleeding during rise of temp. to 3xij.

ANALYSIS OF CASES—continued.

Ref.	Sex	Age	No. of Attack	Duration before onset of Pyrexia	Character of Dis-ease	Total duration of rise	Duration after excess fever	Temp. at death	Temp. F.M.	General symptoms of attack	Sweating during attack Pyrexia	Joints, pain	Post-mortem	Remarks and Treatment
IV. Ringer. Hospital Case Books, 1868 (by permis- sion).	F.	17	?	5 days.	Severe; delirium through- out; T. 103°; 104°-6°; 105°-6°.	19 hours. ?	10 hours; T. from 107°-4°.	?	?	Vomiting; Delirium; Death, sudden.	?	?	Pericarditis, slight; ecchy- moses in heart; lungs and liver congested; spleen small but soft; small amount of pus in joints; other organs healthy.	Citrate of potass.; Colchicum; Bromide of potassium.
V. Dr. H. Weber. 'Trans. Clin. Soc., I.	M.	45	Attack 13 years before.	12 days.	Moderate; T. 101°-4° to 102°-5°.	8 hours? T. night before, 102°-2°.	Death, 8½ hours after; T. 108°; 2 hours after, 109°-5°.	?	?	Large amount of urine, 2 days; vomiting (1); coma (2).	+	?	0	Blisters; Alkalies; Morphia.
VI. Dr. H. Weber. Ib.	M.	25	1st attack.	13 days.	Moderate; T. 102°-2° to 103°-5°.	? 12 hours; T. from 103°-2°.	3 hours; T. from 106°.	?	10 min.; 108°-8° rec., 107°-8° ax.	Large amount of urine 24 hours before attack; delirium (1); coma (2).	+	?	Congestion of brain and ecchy- moses in mem- branes; ecchy- moses of heart; pericard. healthy; congestion and ecchymoses of lungs; of spleen; liver and kidneys; spleen large and pulpy.	Blisters; Morphia.

ANALYSIS OF CASES—continued.

Ref.	Sex	Age	No. of Attack	Duration before extreme Pyrexia	Character of Disease	Total duration of illness	Duration after cessation of fever	Temp. at death	Temp. P.M.	General symptoms of attack	Sweating during extreme Pyrexia	Joints, pain	Post-mortem	Remarks and Treatment
XI. Dr. Quinke. <i>Berlin, Klin. Woch., 1869, vi. 301.</i>	F.	28	?	10 days.	Severe : T. 104°-99° 8 days before death.	2 hours ; 1. from 103°-5° to 109°-9°.	1½ hours ; 1. from 111°-7° 112°-4°.	Yag. 111°-7°.	1½ hour ; 112°-4°.	Delirium ; Cyanosis.	?	?	0	
XII. Dr. Barclay. <i>Lancet, 1870, ii. 154.</i>	F.	23	?	?	Moderate.	3 hours ? death in 3 hours from delirium.	3 hours ?	?	¾ hour 110°-8°	Pain in head occurring suddenly.	?	?	Echymosis of heart and softening of substance ; brain healthy.	
XIII. Dr. Ogle. <i>Lancet, 1870, ii. 154 ; a short notice in Hos- pital Report.</i>	F.	24	2 prev. attacks.	?	?	24 hours. ?	?	Short time before death 110°-8°	?	Vomiting ; dyspnea.	?	?	Spleen soft ; no other morbid change.	
XIV. Mr. Anderson. <i>British Medical Journal, 1871, i. 528.</i>	M.	29	1 prev. attack. 20 years.	1 month.	Mild during month ; severe 3 days.	24 hours. ?	14 hours from 107° ; 1 hour from 110°	?	10 min. 111°-6° ; 20 min. 109°	3 nights suc- cessively before attack cessation of perspiration, followed by de- lirium, which passed off with free perspiration in morning ; until last day attack violent delirium.	Cessation.	Diminish- ed.	Heart healthy ; brain healthy ; lungs congested ; other organs healthy.	Colchicum. Iodide of potass. Warm bath to produce perspi- ration. Aggra- vated delirium on last days. Cold to head. Blister to neck. K. Br. gr. xv.

XV. Mr. Anderson. Ib.	M. 55	1st ?	17 days.	Mild : 3 days slight delirium.	1 hour and 40 minutes. T. first noticed 108° 4° when coma began.	1 hour and 40 minutes. 108° 4° to 111° 1°.	? 111° 1° 25 min. before death	?	Slight delirium 3 days before; alkaline urine; attack sudden; coma.	Ceased.	?	Lungs con- gested; heart and other organs healthy.	Iodide potass., carb. ammon., liq. cinch., Calomel and croton oil given during rise.
	XVI. Mr. Anderson. Ib.	M. 31	8 days.	Mild ; pericar- ditis.	7 hours.	6 hours and 25 minutes from 106° to 110° ; 2 hours from 108° 3° ; 40 min. from 109° 4°	110°	20 min. 108°	Slight excite- ment; coma within 10 minutes; twitching of muscles.	Present at begin- ning of attack, then ceased.		Injection of pericardium ; other organs healthy.	Iodide of potassium with bicarb. potas- sium. Cold to head. Stomatitis to calves. Warmth to body during attack.
	XVII. Author. Case IV.	M. 35	24 days	Severe ; T. often 104° 4° and 105° 4° four days before fatal at- tack ; skin often dry ; urine fre- quently copious (123 oz.) and of low sp. gr. ; 1005°, al- kaline ; com- pexion muddy.	10½ hours from 105° 4° to 111°.	3½ hours from 106° 3° to 111°	? 111° ½ hour before death		Gradual increase of earthy look ; constant copious urination for several days ; delirium occa- sional for several days ; delirium became constant with rise of temperature ; urine and stools involuntary.	Much di- minished, and often ceased during several days.	Pain left joints 5 days be- fore death ; returned slightly day be- fore death.	No pericarditis ; ecchymoses in heart ; vegeta- tion on valves with much hyperemia ; lungs dry, some congestion right base ; spleen large and soft ; liver congested ; brain and all other organs healthy.	Ferri perchl. Mxxx. every 3 hours. Calomel and opium ; before final attack. Chloral gr. xxx.; increased de- lirium ; K. Br. no effect. Can- nabis Ind. gr. ii. no effect. Hypo- dermic inj. of morphia, gr. ½ every night for 10 days. Calo- mel and opium 2 days. T. verat. virid. 4 days.

ANALYSIS OF CASES—continued.

Ref.	Sex	Age	No. of Attack	Duration before extreme Pyrexia	Character of Disease	Total duration of rise	Duration after excessive fever	Temp. at death	Temp. P.M.	General symptoms of attack	Sweating during extreme Pyrexia	Joints, pain	Post-mortem	Remarks and Treatment
XVIII. Dr. Reynolds. Case Books, U.C.H., 1867.	F.	30	2nd attack; liable to rheumatism before; convalescent from scarlatina.	13 days.	Severe: ante-peri-cardial; delirious 5 nights before; death: T. 104.4° to 104.4°; 99.6°; diarrhoea throughout illness.	15½ hours, T. from 104.4° to 110.4°; 2 hours, 83 hours, from 109°; 1 hour, from 110°.	3 hours from 108.4°; 108.4°; 2 hours, from 109°; 1 hour, from 110°.	110.4°	?	Coma throughout.	?	?	0	Tinct. ferri. perchlor.; ice to head.
XIX. Author. Lancet, 1870, ii. 7; Case III.	F.	30	1st	11 days.	Very mild; menst. appeared and then ceased abruptly 2 days before attack: T. below 102° until day before attack.	13 hours, T. from 102.11° to 109° Rec.; Ax. to 44 hours, from 104.8° to 108°.	36 hours.	104.4° 5 min. 99.4°		Violent delirium after full bleeding; coma, trismus, nystagmus, diarrhoea.	?	Ceased.	0	(1) Potass bicarb. & amm. acetat. (2) Bleeding to 30 oz. (3) Baths and sed pack during 36 hours.
XX. Dr. Meding. Arch. für Heilkunde, 1870, xi. 457.	F.	22	? Recovering from Erysipelas.	8 days?	Mod. severe; endocardial mur.; T. 99.5° to 104.2°.	? 108.6°	Recovery.			Pains in head; delirium; semi-coma.	Ceased.	Continued	Recovery.	Digitalis. Cold Packing. Loose Enemata.

XXI. Author. Case I.	F. 49	1st	14 days.	Mod. severe; T. 102°-9°.	12 hours, T. from 104° to 110°; 7 hours, from 105° to 110°.	Recovery.		Gradually de- veloped coma; cyanosis.	Ceased.	Ceased.	Recovery.	Tinct. ferri. perchlor. Qui- nine. Baths.
XXII. Author. Case II.	M. 35	1st	17 days.	Severe; peri- carditis; pneu- monia.	15 hours, from 102° to 107°-8°; 5 hours? from 105°-6° to 107°-3°.	Recovery.		Delirium; ces- sation of pains in joints; dry skin; rapid breathing; pneumonia.	Ceased.	Ceased.	Recovery.	Tinct. ferri. perchlor. Qui- nine. Baths.

I have appended in the annexed plate the sphygmographic tracings of the pulses of Cases I. and II.

The pulse in Mrs. Brophy's case scarcely exhibited any dichrotism; in Caley's the dichrotism was most intense. I would especially direct attention to figures 5 and 9. The former is usually a pulse of almost fatal augury; the latter shows an intensity of the dichrotism which I have never seen equalled or depicted. I was almost doubtful whether the wave intervening between the pulses was not indeed a second short beat; but the regularity of its appearance assured me that it was only an exaggeration of the dichrotic character of the pulse; and Dr. Burdon Sanderson, who was kind enough to examine it with me, confirmed this view of its nature. It will be seen that though the pulse long retained a large amount of the dichrotic tendency, it gradually returned to an approximately normal type.

In the diagrams illustrating the course of the temperature, I have depicted by a blue line the curves of the respiration, and by a red line those of the pulse. It will be seen that the latter were influenced by the baths almost as much as was the temperature. The baths are indicated by signs which are explained in the margin of the diagrams. The horizontal lines indicate fifths of a degree Fahrenheit; the vertical lines represent periods of two hours from midnight to noon and from noon to midnight of each day.